Environmental Assessment

Flamingo Potable Water System Improvement Project

Everglades National Park

Monroe County, Florida

Prepared for

United States Department of the Interior
National Park Service

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Flamingo Potable Water System Improvement Project

EVERGLADES NATIONAL PARK
MONROE COUNTY, FLORIDA

Summary

Two freshwater wells, located 16 miles north of Flamingo, presently serve as the source of Flamingo's potable water. The existing water wells serving Flamingo are under the direct influence of surface waters and contain high levels of organic compounds. Because it takes approximately one day for the water to transit the 16-mile transmission line to Flamingo, the water must be treated and disinfected at the well site. Prior to 2002, chlorination of the Flamingo well water resulted in high levels of trihalomethanes, a disinfection byproduct and suspected carcinogen. The level of trihalomethanes violated drinking water standards. On December 28, 2001, as an interim measure, chlorine treatment at the wells was converted to chloramine (chlorine and ammonia) disinfection, which brought trihalomethanes down to acceptable levels. Concurrently, a new water plant with nanofiltration was constructed to permanently address the drinking water problem. However, during construction, it was determined that leakage in the 16-mile water transmission line prevented adequate flow or pressure in Flamingo to operate the new nanofiltration system. Presently, the combination of chloramine treatment and micro-filtration at the water plant provides the park with safe drinking water but only on an interim basis due to the continuing deterioration of this aging water treatment system.

The National Park Service has investigated a long-term solution to the problem. The park considered but rejected several alternatives before deciding to evaluate the following preferred alternative to provide safe, reliable drinking water for park visitors and employees in an environmentally sound manner..

The preferred alternative consists of plugging and abandoning the existing wells (freshwater) and 16-mile water transmission line, drilling two new (saltwater) wells near the plant, installing a reverse osmosis treatment system in the existing water treatment plant, and replacing the distribution system on an as needed basis. Brine concentrate from the water treatment plant would be piped to the percolation pond near the wastewater treatment plant. A percolation pond is a constructed holding area where reject water infiltrates into the ground (no surface run-off). When the transmission line from the existing wells to Flamingo is abandoned, water from that source would no longer be available at the West Lake comfort station. A small pumping system would be installed to draw surface water from the lake to use for toilet flushing. No treated or potable water would be available at the West Lake comfort station.

Unlike the no action alternative, the preferred alternative would ensure a safe and adequate long-term supply of potable water for visitors and park employees. The preferred alternative would result in minor to moderate, long-term beneficial impacts to several resources, including public health and safety, water quality and hydrology, wetlands, wildlife and habitats, and vegetation.

Public Comment

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. This environmental assessment will be on public review for 30 days. Comments may also be submitted by e-mail to EVER_Flamingo_WW@NPS.gov. Please note that names and addresses of people who comment become part of the public record. **If you wish us to withhold your name and/or address, you much state this prominently at the beginning of your comment.** We will make all submissions from organizations, from businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Comments must be received by August 9, 2002. Please address written comments to:

Superintendent
National Park Service
Everglades National Park
40001 S.R. 9336
Homestead, FL 33034

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PURPOSE AND NEED

The National Park Service proposes to improve the potable water treatment facilities which serve the Flamingo developed area of Everglades National Park for the purpose of providing safe drinking water for current and future water demand. The preferred action is to drill two new wells (saltwater) adjacent to the existing water treatment plant and replace the non-functional nanofiltration system within the plant with a reveres-osmosis unit. The preferred action also includes the abandonment of the two existing wells (freshwater) and 16-miles of transmission line that supply the current plant operation. The reject water from the reverse-osmosis system would be piped to an existing percolation pond adjacent to the existing Flamingo wastewater treatment plant. The action is needed because the present potable water treatment system is not consistently meeting drinking water standards of the Florida Department of Environmental Protection. The need driving this action is the development of an efficient, safe, and reliable water treatment system with the least amount of impact on park resources.

An environmental assessment analyzes the preferred alternative and alternatives and their impacts on the environment. This environmental assessment has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and regulations of the Council on Environmental Quality (40 CFR 1508.9), and the National Park Service's Director's Order (DO) –12 (Conservation Planning, Environmental Impact Analysis, and Decision-making), and the National Historic Preservation Act of 1966 (as amended).

PARK MISSION AND SIGNIFICANCE

On May 30, 1934, Congress passed an act authorizing a park of 2,164,480 acres to be acquired through public and private donation. Everglades National Park was to be "… wilderness where no development … or plan for the entertainment of visitors shall be undertaken which will interfere with the preservation of the unique flora and fauna of the essential primitive natural conditions now prevailing in the area." It took another 10 years, but in 1947, Everglades National Park was established.

The intermingling of plant and animal species from both the tropical and temperate zones, plus the merging of freshwater and saltwater habitats, provide the vast biological diversity that makes Everglades National Park so unique. As the first national park to be established to preserve purely biological resources, the park's significant attributes, features and resources include (NPS 2000a):

- Qualifies as a World Heritage Site, a Biosphere Reserve, a Wetland of International Importance, and an Outstanding Florida Water;
- Supports the largest stand of protected sawgrass prairies in North America;
- Serves as a crucial water recharge area for South Florida through the Biscayne aquifer;
- Provides sanctuary for 20 threatened and endangered species;
- Supports the largest mangrove ecosystem in the western hemisphere;
- Constitutes the largest designated wilderness in the southeast that provides foraging habitat and breeding grounds for migratory wading birds;
- Contains important cultural resources and is the homeland of the Miccosukee tribe of Indians of Florida;

- Functions as a nationally significant estuarine complex in Florida Bay and the park's western coast, providing a major nursery ground that supports sport and commercial fishing;

- Comprises the only subtropical reserve on the North American continent, preserving a major ecological transition zone where diverse temperate and tropical species mingle;

- Functions as a major corridor and stopover for neo-tropical migrants in the south Florida ecosystem;

- Encompasses resources that directly support significant economic activities;

- Engenders inspiration for major literary and artistic works; and

- Offers a place where recreational, educational, and inspirational activities occur in a unique subtropical wilderness.

Everglades National Park's mission is accomplished through pursuit of the following goals:

- The preservation of Everglades National Park's resources;

- The maintenance of the hydrological conditions, including water quality, quantity, distribution and timing, within Everglades National Park and the South Florida ecosystem, which are characteristic of the natural ecosystem prior to Euro-American intervention;

- Providing for public use and enjoyment and a quality visitor experience at Everglades National Park;

- Allowing visitors to Everglades National Park to experience the park's unique subtropical wilderness values;

- Assisting the public in understanding and appreciating Everglades National Park and its role in the South Florida ecosystem and providing support in achieving the park's purpose;

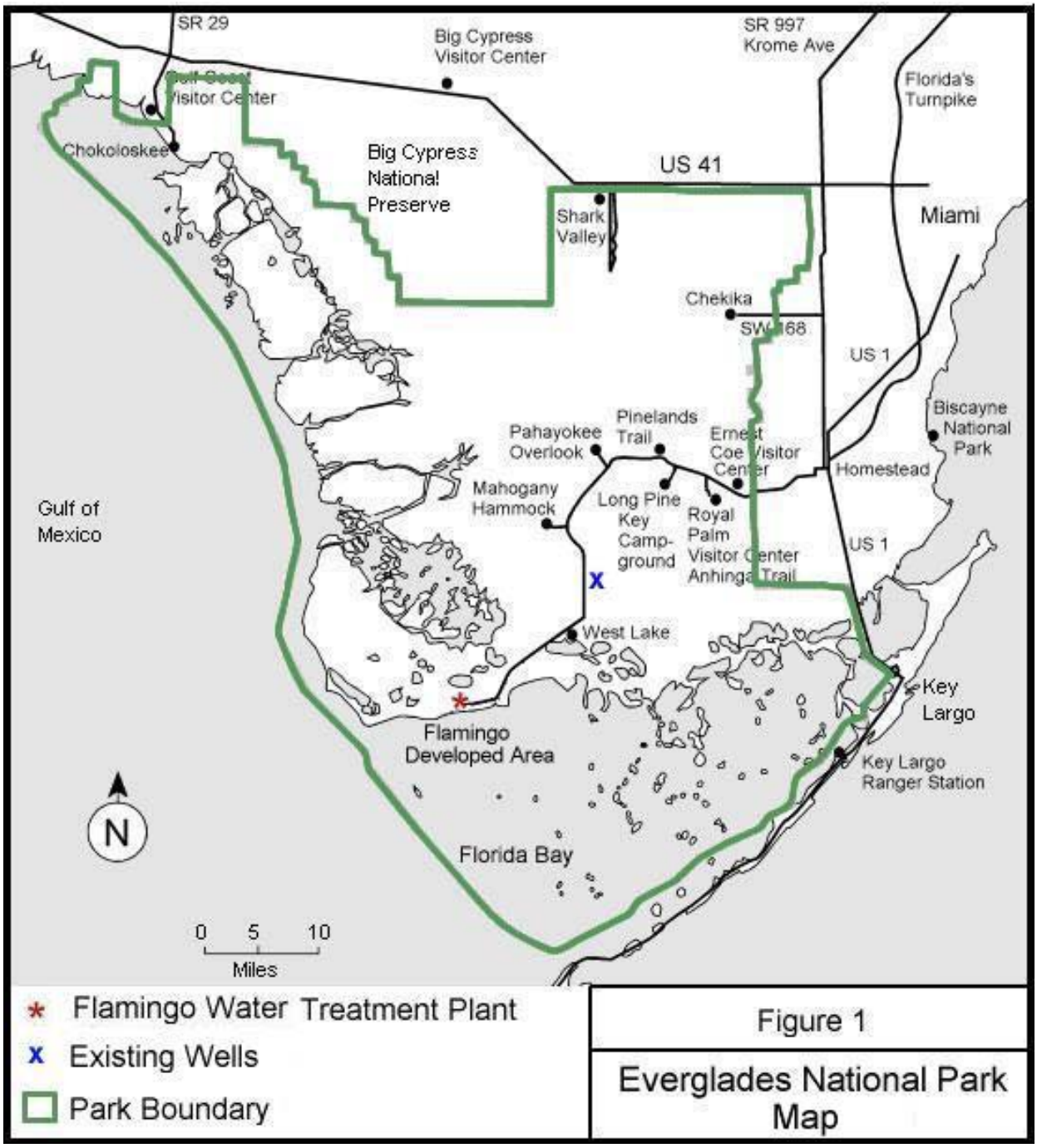
- Strengthening and preserving natural and cultural resources and enhancing recreational opportunities managed by partners; and

- Assuring that the Seminole and Miccosukee tribes have the opportunity to exercise their existing tribal rights within Everglades National Park to the extent and in such a manner that they do not conflict with the park purpose.

PROJECT BACKGROUND, OTHER PROJECTS AND PLANS, OBJECTIVES, SCOPING AND VALUE ANALYSIS

Project Background

Flamingo is the largest developed area within Everglades National Park and receives over 150,000 visitors annually (Figure 1 and Figure 2). The Flamingo potable water system provides visitors, employees, commercial operations (including a marina, restaurant, 100-unit lodge, 278-site campground, and employee housing) with drinking water. The existing potable water system consists of two wells in freshwater wetlands 16 miles northeast of Flamingo, a disinfection/treatment system at the well site, and a 16-mile, 6 inch diameter asbestos/cement transmission line to transport the water to the Flamingo water filtration plant and underground distribution system. The distribution and transmission water lines were constructed in the mid-1950s. The water treatment plant was built


SR 29
Big Cypress Visitor Center
SR 997 Krome Ave
Florida's Turnpike
Visitor Center
Chokoloskee
Big Cypress National Preserve
US 41
Shark Valley
Miami
Chekika
SW 168
US 1
Biscayne National Park
Pahayokee Overlook
Pinelands Trail
Ernest Coe Visitor Center
Homestead
Mahogany Hammock
Long Pine Key Camp-ground
Royal Palm Visitor Center
Anhinga Trail
US 1
Gulf of Mexico
West Lake
Key Largo
Flamingo Developed Area
Key Largo Ranger Station
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Florida Bay
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Miles
* Flamingo Water Treatment Plant
x Existing Wells
Park Boundary
Figure 1
Everglades National Park Map

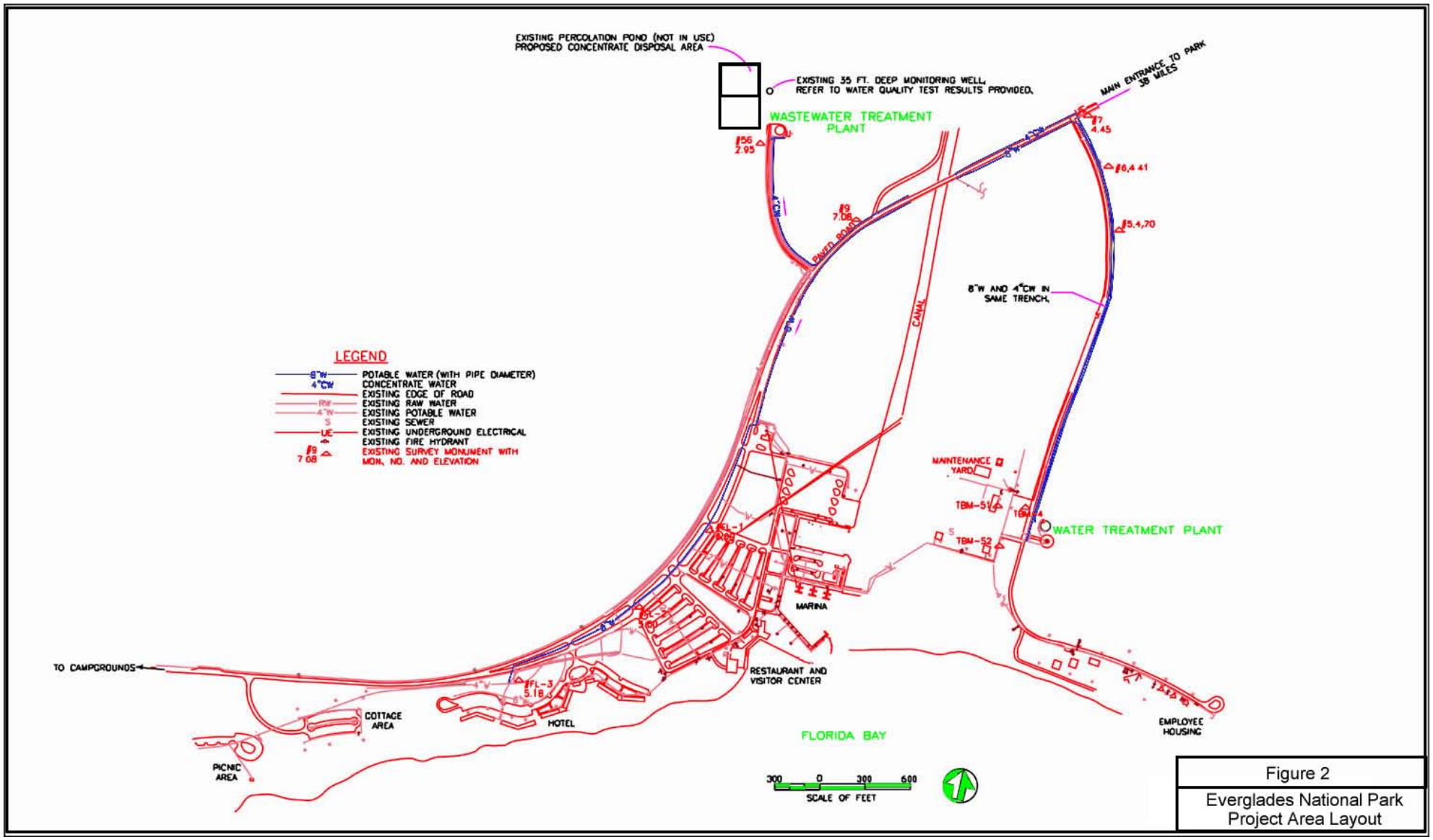

Figure 2

Everglades National Park
Project Area Layout

in 2001. The Flamingo developed area is less than ½ mile from Florida Bay in the largest mangrove ecosystem in the Western Hemisphere, consisting of coastal prairie, mangrove forests and coastal hammock habitats. The existing water wells are Under the Direct Influence (UDI) of surface water and contain high organic compounds. Because it takes approximately one day for water to transit the 16-mile transmission line from the wells to Flamingo, the water must be treated and disinfected at the well site in order to reduce the build up of microorganisms.

Prior to 2002, chlorination of the well water resulted in high levels (300-400 micrograms/liter range) of total trihalomethanes, a disinfection byproduct and suspected carcinogen. This represented a violation of drinking water standards.

A new nanofiltration plant was constructed to address these concerns. However, during construction it was determined that leakage in the 16-mile water transmission line prevented adequate water flow/pressure necessary to operate the new nanofiltration process. Presently, leakage from the transmission line results in the loss of approximately 60,000 gallons of water per day. As an interim measure, chlorine disinfection at the wells was converted to chloramine (chlorine and ammonia) disinfection to bring trihalomethanes down to acceptable levels. In addition, 1-micron cartridge filters were installed in the water treatment plant to comply with Under Direct Influence (UDI) regulations (groundwater that is under the direct influence of surface water must undergo more stringent treatment).

The aged and deteriorating water distribution system leaks 20-30 gallons per minute, requires an ever-increasing frequency of repair. In addition to increased maintenance costs, associated pipe breaks are resulting in increasing numbers of "boil water" orders that result in disruption to visitors, employees and to concessionaire activities (Everglades Scoping Notice, 2002).

Other Projects and Plans

Other projects and plans that are in the vicinity of the Flamingo developed area and have the potential to affect the local environment include:

- **The Flamingo Road Realignment Plan.** Because this planned road realignment project would occur in the same location as the water distribution line replacement, it would be important to coordinate these two projects to ensure that there are no conflicts with site location alignments and scheduling to avoid duplication of efforts, scheduling delays, and to minimize environmental impacts.

- **Flamingo Draft Comprehensive Site Plan- 1998**. The portion of this plan relating to the rehabilitation of Flamingo Campground (replacement of campgrounds/ comfort stations, campground kiosk, new RV dump station, and campground hostess RV developed site) would occur in the same general location as the water distribution line replacement. These two planned actions should be coordinated to avoid duplication of efforts, scheduling delays, and to minimize environmental impacts.

- **General Management Plan Everglades National Park.** Everglades National Park has recently initiated the preparation of a park-wide general management plan. As a matter of policy and professional commitment, this park-wide planning effort would evaluate and coordinate all park plan/actions to ensure compatibility with the long-term vision for the park.

Project Objectives

The objectives are to:

- Improve the potable water treatment system at Flamingo;
- Meet federal, state, and local potable water quality standards;
- Lessen the impact on water resources by designing a potable water treatment system that maximizes water conservation actions and technologies;
- Ensure that reject water is disposed of in an environmentally sound manner;
- Provide potable water at a reasonable cost and with the least amount of impact to park resources;
- Ensure that construction and operation of the improved potable water treatment system does not adversely impact threatened and endangered species, especially with regard to surface disturbance-related impacts on the American crocodile;
- Increase the life span and efficiency of the water treatment system;
- Utilize the existing water treatment plant to the greatest extent possible;
- Improve the system to reduce loss of raw and finished water;
- Minimize adverse impact to visitors, concession operations, and park staff; and
- Utilize efficient and cost effective actions in achieving the purpose and objectives of the project.

Public Scoping

Public scoping is an early and open process to solicit public and internal concerns relating to a proposed action. The Council on Environmental Quality (CEQ 1978) guidelines for implementing the National Environmental Policy Act (NEPA) and the National Park Service's (NPS) National Environmental Policy Act guidelines contained in *Director's Order No. 12: Conservation Planning, Environmental Impact Analysis and Decision Making Handbook* (NPS 2001a) require public scoping of federal actions that will require an environmental impact statement. Although public scoping is not required for an environmental assessment, the National Park Service conducted scoping on potable water management upgrades for the Flamingo developed area to ensure that input was obtained from all interested stakeholders. A five-page scoping brochure was distributed to 600 individuals, organizations, agencies, and Indian Tribes, and posted on the park's web site. The park also held two public scoping workshops in May 2002, one in Everglades National Park and one in Florida City.

For the Flamingo potable water system improvements, scoping was used to help define the range of potable water system alternatives and to help identify the impact topics that should be considered for the project.

Value Analysis

A value analysis was conducted by the National Park Service on July 10, 2000 (Appendix E). Several potable water treatment alternatives with different component options were evaluated including:

1) No Action- maintain existing wells (freshwater), chloramine treatment,

the 16-mile transmission line and continue to use cartridge filters;

2) Maintain existing wells (freshwater), chloramine treatment, the 16-mile transmission line and rehabilitate existing non-functional nanofiltration unit;

3) Maintain existing wells (freshwater) and chloramine treatment; replace transmission line (trenching method) and rehabilitate existing non-functional nanofiltration unit;

4) Maintain existing wells (freshwater) and chloramine treatment; replace transmission line ("slip line" method) and rehabilitate existing non-functional nanofiltration unit;

5) Drill two new wells (saltwater)/ convert existing plant to reverse-osmosis system and abandon existing wells and transmission line.

In evaluating the attributes, advantages, and costs, the Value Analysis determined that option 5 above-- drill new wells (saltwater) and convert the existing system to reverse-osmosis-- reflected the best cost/benefit per advantage ratio when compared to options 1-4.

ISSUES, CONCERNS AND DERIVATION OF IMPACT TOPICS

Issues and concerns related to the Flamingo Potable Water System Improvements project were identified by the park staff with input from the public, partners, agencies, and tribal organizations. The issues included:

- Inability of the aging potable water treatment system to consistently meet drinking water standards of the Florida Department of Environmental Protection;
- Leakage from the existing transmission line, allowing chemically treated water (chloramines) to potentially effect wetlands;
- Leakage from aging distribution system now contributing to the inefficient operation of the potable water treatment operation;
- Continued increase in potable water outages, requiring "boil" orders that disrupt the visitor experience, concession and park operations;
- Continued deterioration of the existing potable water treatment system and the associated increases in maintenance costs over time; and
- Increased maintenance of aging system and associated disruption to wildlife and potential damage to cultural resources caused by frequent maintenance activities.

These issues include potential impacts to:

- Human health and safety (potable water supply)
- Water quality and hydrology
- Wetlands
- Wildlife and protected species
- Cultural resources
- Visitor use and experience

Impact Topics Analyzed in this Environmental Assessment

Specific impact topics were developed for discussion focus, and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on federal laws, regulations, and Executive Orders; 2001 NPS

management Policies; and National Park Service knowledge of limited or easily impacted resources. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

Impact topics are the resources of concern that could be affected by the range of alternatives. Specific impact topics were developed to ensure that alternatives were compared on the basis of the most relevant topics. The following impact topics were evaluated: public health and safety; water quality and hydrology; wetlands and floodplains; wildlife and wildlife habitat; endangered, threatened, and protected species, aquatic life; vegetation; cultural resources; visitor use and experience, and park operations.

The impact topics originally considered for the Flamingo water collection, treatment and distribution upgrade at Everglades National Park are presented in Table 1. The table includes key regulations or policies for each impact topic. Based on site-specific conditions described below, several of the candidate impact topics were dismissed from further consideration. The rationale for dismissing impact topics is given below.

TABLE 1: IMPACT TOPICS FOR POTABLE WATER SYSTEM UPGRADES AT FLAMINGO, EVERGLADES NATIONAL PARK

Impact Topic	Relevant Regulations or Policies
Retained	
Public health and safety	NPS *Management Policies 2001*
Hydrology and water quality	Clean Water Act, Executive Order 12088, Executive Order 11990, NPS *Management Policies 2001*
Wetlands and floodplains	Executive Order 11990, Clean Water Act Section 404, NPS Director's Order #77-1, Executive Order 11988.
Wildlife and wildlife habitat	NPS *Management Policies 2001*
Endangered, threatened, or protected species and critical habitats	Endangered Species Act; NPS *Management Policies 2001*
Aquatic Life	NPS *Management Policies 2001*
Vegetation	NPS *Management Policies 2001*
Cultural resources	Section 106; National Historic Preservation Act; 36 CFR 800; National Environmental Policy Act; Executive Order 13007; Director's Order 28; NPS *Management Policies 2001*
Visitor use and experience	Organic Act; NPS *Management Policies 2001*
Park operations	NPS *Management Policies 2001*
Dismissed	
Air quality	Federal Clean Air Act (CAA), CAA Amendments of 1990 (CAAA), NPS *Management Policies 2001 Florida Administrative Codes Chapter 62: Air Resource Management Program.,.*
Ecologically critical areas or other unique natural resources	Wild and Scenic Rivers Act, 36 CFR 62 criteria for national natural landmarks, NPS *Management Policies 2001*
Prime and unique agricultural lands	Council on Environmental Quality 1980 memorandum on prime and unique farmlands
Soils	NPS *Management Policies 2001*
Soundscapes/Noise	NPS *Management Policies 2001*
Wilderness	1964 Wilderness Act, Director's Order 41, NPS *Management Policies 2001*
Conflicts with land use plans, policies, or controls	NPS *Management Policies 2001*
Economics	40 CFR 1500 Regulations for Implementing NEPA
Energy requirements and conservation potential	NPS *Management Policies 2001*
Environmental justice	Executive Order 12898
Indian trust resources	Department of the Interior Secretarial Order No. 3206, Secretarial Order No. 3175
Natural or depletable resource requirements and conservation potential	NPS *Management Policies 2001*

Impact Topics Dismissed from Further Analysis (rationale for dismissal)

Air quality: Everglades National Park enjoys a Class I clean air status. Lands with this designation are subject to the most stringent regulations. Very limited increases in pollution are permitted in the vicinity (NPS 1994). This high air quality is a valuable park resource, enhancing visitation by providing clean air and high visibility to match the unique ecosystem experience. The Clean Air Act of 1963 (42 USC 7401) requires federal land managers to protect air quality, and the 2001 NPS Management Policies direct air quality to be analyzed when planning park projects and activities. The Flamingo project area is developed, and receives approximately 150,000 visitors annually, most arriving by automobile. The no action alternative proposes no construction activities, and no change in air quality would result. Under the preferred alternative, surface disturbance is minimal, and fugitive dust would not likely affect visitors or staff. Emissions from construction vehicles would be kept to a minimum by restricting idling time. In the context of activities and facilities at Flamingo, no appreciable effects to air quality would be anticipated under either alternative.

Ecologically critical areas: Everglades National Park does not contain any designated ecologically critical areas, wild and scenic rivers, or other unique natural resources, as referenced in 40 CFR 1508.27.

Prime and unique agricultural lands: Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique land is land other than prime farmland that is used for production of specific high-value food and fiber crops. Both categories require that the land is available for farming uses. Lands within Everglades Park are not available for farming and, therefore, do not meet the definitions.

Soils: None of the proposed activities included in this assessment would create new disturbance at Everglades National Park. The project area is within the previously developed areas of Flamingo that include infrastructure components, visitor facilities and park housing. Any topsoil disturbance would be mitigated by banking and returning the soil to its original location after construction activities were complete. No notable effect to soils resources in the park would be anticipated to result from any alternative evaluated in this assessment.

Soundscapes/Noise: The National Park Service must strive to preserve the natural quiet and natural sounds associated with the physical and biological resources of the park. Alternatives addressed in this document have little or no potential to adversely affect the soundscape of the Flamingo developed area. The existing noise level of the vicinity includes traffic and other sounds of visitor use and park maintenance and operations. The sounds of the water treatment plant operation would not likely be heard more than a few yards outside the water treatment plant building. Noise associated with construction of Alternative B, the Preferred, would be short-term and negligible.

Wilderness: Everglades National Park contains 1,296,500 acres of designated wilderness, or 86 percent of the total park area. Development in the park is limited to corridors associated with visitor use and the presence of existing services, utilities, and infrastructure. The actions proposed in the alternatives are limited to the developed area of the Flamingo. None of the proposed actions would affect wilderness resources or values of Everglades National Park.

Conflicts with land use plans, policies, or controls: Refer to the section " Project's Relationship to Other Plans" for a discussion of the absence of conflicts with other plans.

Economics: None of the alternatives described in this environmental assessment would have notable effects on local or regional economic activities. Tourism and visitor contributions to the local economy would not be affected by continuation of current management nor by installation of the proposed water treatment system. The South Florida economy is large and supported by a multitude of activities. Construction activities associated with the Preferred Alternative would not contribute measurably to the local or regional economy.

Energy requirements and conservation potential: The National Park Service reduces energy costs, eliminates waste, and conserves energy resources by using energy-efficient and cost-effective technology. Energy efficiency is incorporated into the decision-making process during the design and acquisition of buildings, facilities, and transportation systems that emphasize the use of renewable energy sources.

Environmental justice: Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires that all federal agencies address the effects of policies on minorities and low-income populations and communities. None of the alternatives would have disproportionate health or environmental effects on minorities or low-income populations as defined in the Environmental Protection Agency's Draft Environmental Justice Guidance (July 1996).

Indian trust resources: Indian trust assets are owned by Native Americans but held in trust by the United States. Requirements are included in the Secretary of the Interior's Secretarial Order No. 3206, "American Indian Tribal Rites, Federal – Tribal Trust Responsibilities, and the Endangered Species Act," and Secretarial Order No. 3175, "Departmental Responsibilities for Indian Trust Resources." According to NPS personnel, Indian trust assets do not occur within Everglades National Park.

Natural or depletable resource requirements and conservation potential: Sustainable practices minimize the short- and long-term environmental impacts of development and other activities through resource conservation, recycling, waste minimization, and the use of energy-efficient and ecologically responsible materials and techniques. Project actions would not compete with dominant park features or interfere with natural processes, such as the seasonal migration of wildlife or hydrologic activity associated with wetlands.

ALTERNATIVES

Two Alternatives are addressed in the environmental assessment, Alternative A- No Action and Alternative B- the Preferred Alternative. Alternative B is preferred because it best meets the objectives associated with the purpose of the proposed action.

Alternatives that were considered but rejected prior to the preparation of this environmental assessment are presented below. The section addressing alternatives considered but rejected is presented following the section describing the characteristics of the alternatives. Subsequently, each of the alternatives retained for analysis are presented in detail.

Refer to Figures 1 and 2 for the location maps of the project site.

DESCRIPTION OF THE ALTERNATIVES

The alternatives section describes two alternatives for the Flamingo Potable Water System Improvement Project. Alternatives for this project were developed to resolve the issues listed on page 7 of this document.

The no action alternative describes the action of continuing the present management operation and condition. It does not imply or direct discontinuing the present action or removing existing uses, developments, or facilities. The no action alternative provides a basis for comparing the management direction and environmental consequences of the preferred alternative. Should the no action alternative be selected, the National Park Service would respond to future needs and conditions associated with the park's issues without major actions or changes from the present course.

The preferred alternative presents the National Park Service proposed action and defines the rationale for the action in terms of resource protection and management, visitor use and operational use, costs, and other applicable factors.

The National Park Service has adopted the concept of sustainable design as a guiding principle of facility planning and development. The objectives of sustainability are to design park facilities to minimize adverse effects on natural and cultural values, to reflect their environmental setting, and to maintain and encourage biodiversity; to construct and retrofit facilities using energy-efficient materials and building techniques; to operate and maintain facilities to promote their sustainability; and to illustrate and promote conservation principles and practices through the sustainable design and ecological sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. The preferred alternative subscribes to and supports the practice of sustainable planning, design, and use of the potable water treatment facility.

Alternative A: No Action/Continue Current Management

Continue current management/no action is the baseline condition against which proposed activities are compared. It is defined as taking no action to change or alter current conditions.

Under the no action alternative there would be continued under-utilization of the new water plant. The water treatment system would utilize only micro-filtration, the new storage tank, and deteriorating transmission/distribution lines. The raw water from the two existing wells, located 16 miles from Flamingo, would continue to receive chloramine, PO_4, and Aquamag ® treatment at the well site. This temporary chloramine treatment would continue to allow the park to meet all state standards, including standards for trihalomethanes. Water loss from the 16-mile transmission line would continue to discharge chloramine treated water (approximately 60,000 gallons per day) into the wetlands. Continuing repair of the aging transmission line would require frequent trenching along the road shoulder adjacent to wetlands. Erosion control measures would be needed to prevent soil runoff, turbidity, and inadvertent filling of wetlands. Frequent electrical repairs at the well site to maintain the automatic pump control system between the Flamingo maintenance headquarters and the well site would continue to burden the maintenance operation.

The West Lake comfort station toilets would continue to use chloramine treated water from the existing well transmission lines; however, because the water is not filtered, there would continue to be no human contact with water (use of hand sanitizer would continue).

For Alternative A- No Action, the total life cycle cost estimate, plus unknown repairs is estimated at $1,583,136 (Value Analysis,

2000). The initial construction cost of this alternative is $0.

Alternative B: The Preferred Alternative

Alternative B has been identified as the preferred alternative because it meets the objectives associated with the purpose and need for the proposed action and is the environmentally preferred alternative.

Under the preferred alternative, the existing two wells and 16-miles of water transmission line would be plugged and abandoned. All well related support structures would be removed from the well site. The paved road (100 yards) to the well site would remain, providing access to the park's electric transformer station.

The existing nanofiltration system in the water plant would be removed and replaced with a new reverse-osmosis treatment system (Figure 3). The treatment plant electrical system would be upgraded to better serve the reverse-osmosis process. Two new saltwater wells (submersible pumps) would be drilled near the water treatment plant to supply the new reverse-osmosis system. The new water storage tank next to the water plant would continue to be used.

The reject water (concentrated brine water) would be piped to the existing percolation pond (180,000 gallons per day) located next to the wastewater treatment plant. The percolation pond would remain unfenced, and vegetation removed or mowed prior to its use and its borders would be mowed to remove vegetation. The existing reject water pipe from the water treatment plant to the wastewater treatment plant would be extended 300 feet to reach the percolation pond.

The water distribution system would be replaced (as required) using a pipe bursting replacement technique where possible to reduce surface disturbance.

For Alternative B- the Preferred Alternative, the total life cycle cost estimate, is estimated at $2,588,462 (Value Analysis, 2000). The initial construction cost of this alternative had been originally estimated at $1,130,800; however, the cost was recently re-estimated at $2.5 million.

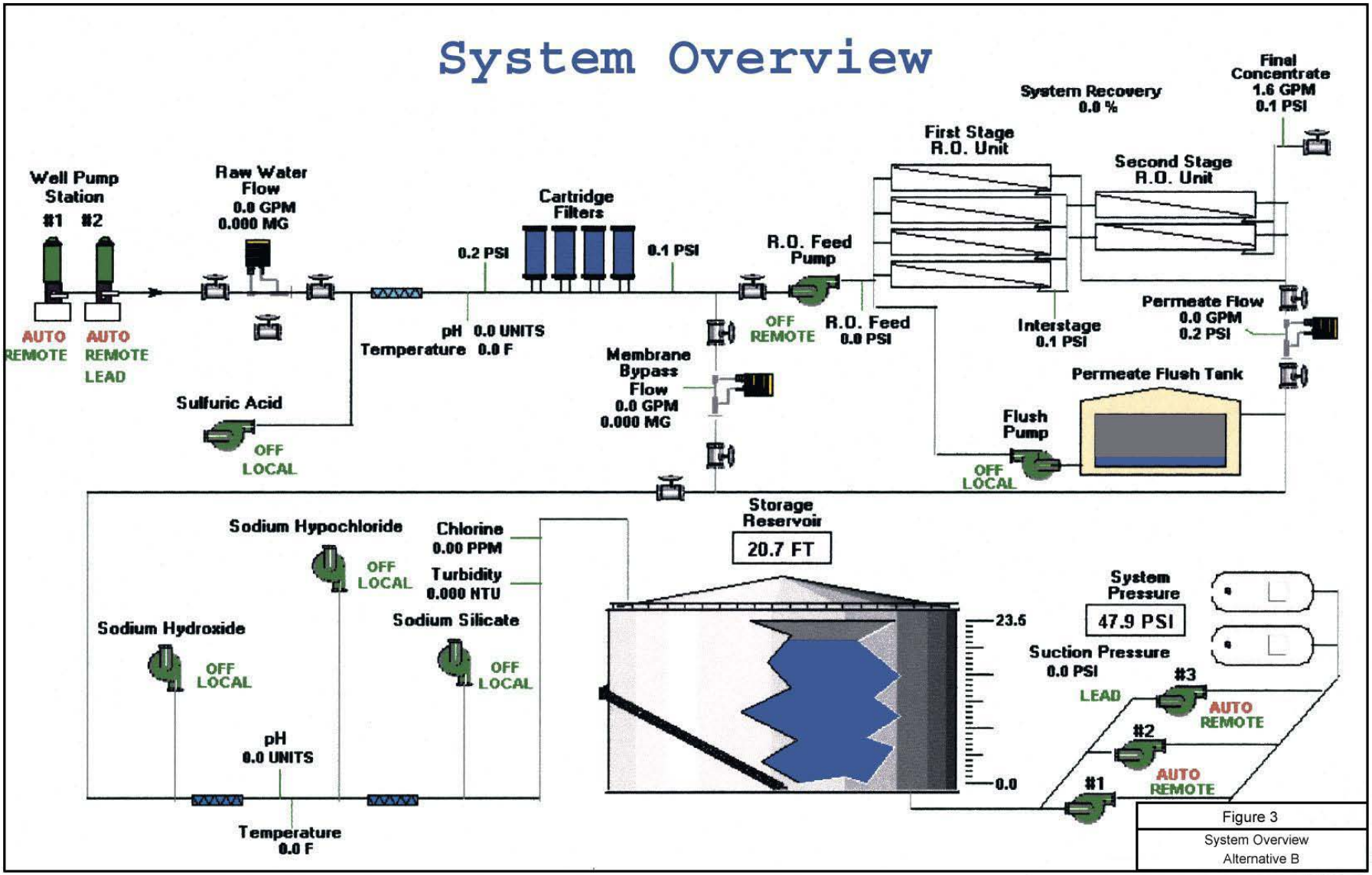

Figure 3
System Overview
Alternative B

The West Lake comfort station would utilize surface water from West Lake to provide water for flush toilets. The comfort station would continue to provide hand sanitizers (no human contact with the water). A new water pump, new pipe system (50 feet), and pipe box screen cover would be installed to provide water to the comfort station. The comfort station would continue to use the existing septic system.

Alternative B would be the environmentally preferable alternative. The rationale for this decision is presented in the following section.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with D.O.12: "Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making (NPS 2001a)", the National Park Service is required to identify the "environmentally preferred alternative" in all environmental documents, including environmental assessments. The environmentally preferred alternative is determined by applying the criteria suggested in the 1969 National Environmental Policy Act, which is guided by the Council on Environmental Quality. The Council on Environmental Quality provides direction that "the environmentally preferred alternative is the alternative that will promote the national environmental policy as expressed in Section 101 of the National Environmental Policy Act, which considers: (1) fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations; (2) assuring for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings; (3) attaining the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences; (4) preserving important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice; (5) achieving a balance between population and resource use which would permit high standards of living and a wide sharing of life's amenities; and (6) enhancing the quality of renewable resources and approach the maximum attainable recycling of depletable resources." The environmentally preferable alternative for the proposed Everglades National Park (Flamingo) Potable Water System Improvements project is based on applying these national environmental policy goals to the evaluation and decision-making processes.

The preferred alternative would attain the widest range of beneficial uses of the environment, biological, visitor safety and enjoyment, and cultural resource protection, without degradation of resources. Specifically, Alternative B would provide a higher level of health and safety for visitors and park employees when compared to the no action alternative by providing a dependable supply of potable water that would consistently meet all federal, state, and local standards. Reverse-osmosis is a proven technology, providing a more efficient and reliable system for ensuring the park has an adequate long-term supply of potable water. Abandoning the existing wells and 16-miles of leaky transmission lines lessen the impact on one of the park's exceptional resource values: wetlands. Centralizing the water treatment components that comprise this system would also lessen the burden on park staff, reducing downtime now associated with travel to and from the well site. This more compact system would also impact less surface area of the park, increase maintenance efficiency, and reduce maintenance activities that have the potential to disrupt wildlife movements and habitat and cause disruption to the visitor experience.

The no action alternative would not meet the park's management objective to provide a long-term, reliable source of potable water that would consistently meet federal, state, and local standards. Under the no action alternative, resource impacts, especially on wetlands, would be expected to increase with continued deterioration of the 16-mile water transmission line. Also the increased maintenance that would be expected with continued use of the existing water treatment system would have long-term adverse impacts on the visitor experience. Thus, the no action alternative does not meet national environmental policy goals as well as the preferred alternative.

ALTERNATIVES CONSIDERED BUT REJECTED

Re-adapt The Existing Nanofiltration Unit

The existing nanofiltration unit within the existing water treatment plant was installed but never put into operation because it was later determined that leakage from the well transmission line limited the amount/pressure of water necessary for operation of the nanofiltration system. For the nanofiltration system to work, 16-miles of new transmission line would need to be replaced. Because pipe bursting would be required to limit adverse effects on wetlands, the cost of transmission line replacement using this technique would be approximately $2.8 million. The "slip line" replacement technique for replacing the transmission line was also considered but rejected on the basis of being more labor intensive, and it would continue to have potential long-term adverse effect on wetlands. Although both the pipe bursting and slip line techniques would eliminate the need for trenching, the action would still result in having to maintain a transmission line along the road shoulder that would require continued repair. Even with the new transmission line, the length of the transmission system would still allow a build-up of microorganisms and nutrients. Chloramine and phosphate (PO_4) would have to continue to be added at the well site to reduce the level of microorganisms and nutrients prior to reaching the plant. Also, an additional system would have to be installed in the plant to remove chloramine prior to entering the nanofiltration system because the chloramine damages the filters.

Readapting the plant to nanofiltration, utilizing the existing wells (chloramine and PO_4 treatment), and replacing the transmission/distribution line system would require:

- Continued use of hazardous chemicals (chlorine and ammonia) at the existing well site (chloramine for disinfections).

- Continued use of both PO_4 and Aquamag ®. These two chemicals would be added to the raw well water to facilitate removal of suspended sediments from the water and reduce pipe corrosion.

- Excessive travel time, scheduling, and frequent maintenance associated with the existing well site operation. The well location requires a 32-mile roundtrip from the Flamingo maintenance facility.

- Intensive labor, potential impacts to wetlands, and higher maintenance costs. The water transmission line is buried along the shoulder of the main park road adjacent to wetlands. Replacing the water transmission line would require intensive labor because the top of each road culvert (located every 0.10 mile along this 16-mile road) would have to be cut away as part of line replacement. This reduction in culvert diameter would trap debris leading to clogging of the culverts. The construction detail is

inappropriate and would result in higher maintenance costs.

- Require the use of a temporary water treatment plant or potable water hauling/storage system during the 6 months it would take to replace the 16-mile transmission line.

- Long-term maintenance of the water transmission line with continuing potential adverse impact to the wetlands.

- Visitors would be subjected to delays along the main park road during transmission line replacement.

Connect with the Municipal Water System in Florida City

The cost of developing a 48-mile water transmission line and pump stations from the Florida City Municipal Water Supply to the park would be approximately $19 million. The alternative would also have the potential for encouraging commercial and residential development on prime agricultural lands adjacent to the park.

Deep well injection for reverse-osmosis reject water

Deep well injection for reverse-osmosis reject water would be expensive ($3-4 million in addition to the cost of Alternative B - $2.6 million) and has a low probability of being successful. Deep well injection requires locating a confinement layer that will seal off reject water from ground water aquifers. There is always the possibility that a confinement layer may not be located which would result in a total loss of expenditure. The permitting for deep well injection is also complicated and controversial due to the potential for long-term aquifer contamination.

Eco Pond for Reverse-Osmosis Reject Water

Using Eco Pond for brine reject water from the reverse-osmosis process would adversely alter the aquatic system and wildlife now associated with this high profile visitor use area. Although the pond was originally designed for and is presently being used to accept treated effluent from the wastewater treatment system, the water quality in the pond supports the only "freshwater" habitat in the immediate area. The pond now has a value beyond its original purpose for holding treated effluent from the wastewater plant. The Eco Pond now serves as a popular aquatic/wildlife viewing area for this portion of the park. Pumping highly saline reverse-osmosis reject water into the pond would adversely alter the aquatic/wildlife system and eliminate the pond's value as an established visitor attraction.

HOW THE ALTERNATIVES MEET THE OBJECTIVES OF THE PROPOSED ACTION

Alternative A, the no action alternative, would not meet the project objectives. Adverse impacts to water resources would not be corrected due to the continued use and leakage of the existing transmission line. The aging distribution lines in the Flamingo area would continue to be used and would need constant repair. And, there is potential that federal, state and/or local potable water standards would not be met at all times.

Alternative B, the proposed action, would meet the project objectives because it would result in the installation of a new water collection, treatment, and distribution system. The proposed action would:

- Improve the potable water treatment system at Flamingo;

- Meet federal, state, and local drinking water standards;
- Lessen the impact on water resources by designing a water treatment system that would maximize water conservation actions and technologies;
- Ensure that reject water is disposed of in an environmentally sound manner;
- Provide potable water at a reasonable cost and with the least amount of impact to park resources;
- Ensure that construction and operation of the improved water treatment system would not adversely impact threatened and endangered species, especially regarding surface disturbance impacts on the American crocodile;
- Increase the life span and efficiency of the water treatment system;
- Utilize the existing water treatment plant to the greatest extent possible;
- Improve the system to reduce loss of raw and finished water;
- Minimize adverse impact to visitors, concession operations, and park staff; and
- Use efficient and cost effective actions to achieve the purpose and objectives of the project.

COMPARISON OF ALTERNATIVE EFFECTS

Table 2 presents a summary comparison of the effects of the alternatives based on the evaluations of the impact topics in the Environmental Consequences section of this environmental assessment. The terms used to define the magnitude or intensity of the effects (e.g., negligible, minor) are described in Table 3.

TABLE 2: COMPARISON OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative A No Action/Continue Current Management	Alternative B Preferred Alternative
Public health and safety	Under the no action alternative, the potential for water supply contamination through infiltration into piping and during system failure would persist. In addition, park staff would continue to be exposed to chlorine and ammonia gases. These would yield minor, short and long-term, adverse effects on public health and safety at Flamingo.	Rehabilitation of the water system serving Flamingo would provide increased protection from water system contamination and enhance water treatment system reliability. This would result in short and long-term, beneficial effects of minor intensity that would extend to all local water users.
Hydrology and water quality	Continuation of the no action alternative would result in localized, adverse effects to hydrology. Under this alternative, freshwater withdrawal from shallow aquifers continues (cone of depression), the access road to the existing well site would be maintained (interruption of sheet flow), and the leaky transmission line would be left in place (discharged of chemically treated water into wetland). These factors would yield direct, negligible to minor, short and long-term, adverse effects on hydrology within the project area.	Under the preferred alternative, both beneficial and adverse effects to water quality and hydrology would result. Cessation of freshwater aquifer withdrawals would contribute beneficially, but negligibly, to reduced usage of valuable freshwater supplies. Abandonment of the existing leaky transmission line would also result in a beneficial effect of minor intensity as treated water would no longer be discharged into wetlands. Other effects on hydrology and water quality of the project area would be adverse, negligible to minor, and both short and long-term. These adverse effects include continued presence of the well site access road, use of surface water from West Lake for toilet flushing, and potential generation of a high salinity groundwater plume from the percolation pond to Buttonwood Canal.

TABLE 2: COMPARISON OF IMPACTS OF THE ALTERNATIVES (CONTINUED)

Impact Topic	Alternative A No Action/Continue Current Management	Alternative B Preferred Alternative
Wetlands and floodplains	Continuation of the no action alternative would result in localized, adverse effects to the wetland environment within the project area. Under this alternative, withdrawal from shallow freshwater aquifers would continue, the access road to the existing well site, which impedes surface flows, would be maintained, and the leaky transmission main would be left in place. These factors would yield direct, negligible to minor, short and long-term, adverse effects on wetlands within the project area. Water supply components located within the floodplain would experience continued increased risk of inundation during hurricanes and tropical storms, resulting in long-term, minor, adverse effects on the floodplain of the project area.	Under the preferred alternative, the new water system would contribute both beneficial and adverse effects to wetlands and floodplains the project area. Eliminating freshwater withdrawal at the existing wells and abandoning the 16-mile transmission main would yield negligible to minor, beneficial effects localized to wetlands at the well site and along the utility corridor. Because the access road would remain in place, an adverse, long-term, minor effect would continue. Purging the new system and releasing 2,000 gallons of saltwater into nearby mangroves would produce an adverse, but negligible effect in the mangrove wetland. Brine infiltration from the percolation pond would increase salt-tolerant species and produce minor, long-term localized, adverse effects over an area of approximately 5 to 10 acres. Under the preferred alternative, water supply components would be centralized, reducing the flood hazard. This would result in long-term, minor beneficial effects to the floodplain of the project area.
Wildlife and wildlife habitat	Park staff travel to and from the well site would continue as a result of implementing the no action alternative, and the negligible, long-term, adverse effects associated with incidents between vehicles and wildlife would continue.	The preferred alternative would result in short and long-term, negligible to minor, adverse effects on wildlife and wildlife habitats. These effects would be largely due to disturbances related to drilling new wells in the vicinity of the water treatment plant, replacement of the distribution lines (as needed), and also the elongation of the existing concentrate pipeline (by 300 feet) running from the water treatment plant to the percolation pond. Negligible to minor, long-term, adverse effects would also occur while mowing of the percolation pond is taking place. Effects in both instances would be attributed to the physical intrusion of personnel and machinery and the noise they produce.

TABLE 2: COMPARISON OF IMPACTS OF THE ALTERNATIVES (CONTINUED)

Impact Topic	Alternative A No Action/Continue Current Management	Alternative B Preferred Alternative
Endangered, threatened, and protected species and critical habitats	The effects to endangered and threatened species under the no action alternative range from "no effect" to "may affect, not likely to adversely affect." The disturbance that could occur along the transmission line corridor would result from the need for repairs, and would not occur on a set schedule. Surface disturbance and excavation would be small scale and of duration sufficient only to complete repairs.	The effects to endangered, threatened, and protected species under the preferred alternative range from "no effect" to "may affect, not likely to adversely affect." Additionally, there would be no adverse effects to the designated critical habitats of any of these species. Abandonment of the 16-mile water transmission line would benefit species that inhabit the corridor because disturbance associated with maintenance and repair would be eliminated. Replacing portions of the distribution system, as needed, and installation of 300-feet of brine discharge piping to the percolation pond would require short-term disturbance that would produce little effect on these species or their habitats.
Aquatic life	Short and long-term, adverse impacts to freshwater and marine aquatic life resulting from the implementation of the no action alternative would range from negligible to minor, and would result from the continued draw down of groundwater in the area of the existing freshwater wells, and the continued leaking of chemically treated water from the transmission line.	Short and long-term, adverse impacts to aquatic life resulting from the implementation of the preferred alternative would range from negligible to minor, and would result from the release of 2,000 gallons of purged saltwater into mangroves, a drawdown of saltwater in the vicinity of the water treatment plant; and a change in community composition in the area surrounding the percolation pond and between Buttonwood Canal and the percolation pond. A long-term, negligible to minor, beneficial effect to aquatic life would result from the cessation of chemically treated water leaking into the wetlands surrounding the transmission line.
Vegetation	Short and long-term, negligible to minor adverse effects to vegetation would result from the continued draw down of groundwater in the area of the existing freshwater wells, the continued need for repairs on both the transmission and distribution system pipes, and the continued leaking of chemically treated water from the transmission line.	Short and long-term, adverse impacts to vegetation resulting from the implementation of the preferred alternative would range from negligible to minor, and would result from the release of 2,000 gallons of purged saltwater into mangroves, a drawdown of saltwater in the vicinity of the water treatment plant, and a change in community composition in the area surrounding the percolation pond. A long-term, negligible to minor, beneficial effect to vegetation would result from the cessation of chemically treated water leaking into the wetlands surrounding the transmission line.

TABLE 2: COMPARISON OF IMPACTS OF THE ALTERNATIVES (CONTINUED)

Impact Topic	Alternative A No Action/Continue Current Management	Alternative B Preferred Alternative
Cultural resources	Because there is no excavation in previously undisturbed areas, there is little potential for this alternative to expose unknown sites. In addition, no known cultural resources are present in the project area. There would be no effects to cultural resources as a result of implementation of the no action alternative.	Because all disturbance associated with the preferred alternative occurs on fill and in previously disturbed areas, it is unlikely that there would be detectable effects on cultural resources as a result of implementation of this alternative.
Visitor use and experience	The no action alternative would have a direct, moderate, adverse effect on visitor use and experience due to the deteriorating condition of the existing water treatment system and the resulting frequent potable water outages that would be expected to occur for both the short and long-term. Continued and increasing maintenance activity associated with the repair of this deteriorating system would have a direct, short and long-term, moderate, adverse impact on the visitor experience because the transmission and distribution lines are within or visible from primary visitor use areas.	The preferred alternative would have a direct, short and long-term, moderate beneficial effect on the visitor experience because the new reverse-osmosis system would consistently meet drinking water standards along with providing an adequate and reliable drinking water supply for present and future visitor needs. Although the reverse-osmosis system is maintenance intensive, the maintenance activities would be more localized to the maintenance area. This more localized maintenance activity would have a direct, long-term, minor to moderate beneficial effect on the visitor experience due to reduction of maintenance activities occurring in areas that are within or visible from primary visitor use areas.
Park operations	The no action alternative would not result in any changes to existing negligible to moderate, short and long-term, adverse effects to staffing and scheduling, brought about by the over utilization of current staff, dispersed locations of the various components of the water treatment system, and the age of some of these components. These conditions would continue.	The preferred alternative would result in some short-term, negligible to minor, adverse effects to park operations related to the training of staff on the new, more technically demanding system, and overseeing and working on the proposed project. Short and long-term, minor to moderate, beneficial effects would include the removal of existing antiquated, maintenance intensive systems and the installation of new ones.

TABLE 3: DEFINITIONS OF IMPACT THRESHOLDS

	Impact Threshold Definition				Duration
Impact Topic	**Negligible**	**Minor**	**Moderate**	**Major**	
Public health and safety	Public health and safety would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on the public health or safety.	The effect would be detectable, but would not have an appreciable effect on public health and safety. If mitigation were needed, it would be relatively simple and likely successful.	The effects would be readily apparent, and would result in substantial, noticeable effects to public health and safety on a local scale. Changes in disease rates or injury could be measured. Mitigation measures would probably be necessary and would likely be successful.	The effects would be readily apparent, and would result in substantial, noticeable effects to public health and safety on a regional scale. Changes could lead to mortality. Extensive mitigation measures would be needed, and their success would not be guaranteed.	Short-term – Effects occur only during project implementation activities. Long-term – Effects extend beyond project implementation activities.
Water quality and hydrology	Impacts would not be detectable. Water quality parameters would be well below all water quality standards for the designated use of the water. Both quality and quantity of flows would be within historical conditions.	Impacts would be measurable, but water quality parameters would be well within all water quality standards for the designated use. Both quality and quantity of flows would be within the range of historical conditions, but measurable changes from normal flows would occur. State water quality and antidegradation policy would not be violated.	Changes in water quality or hydrology would be readily apparent, but water quality parameters would be within all water quality standards for the designated use. Water quality or flows would be outside historic baseline on a limited time and space basis. Mitigation would be necessary to offset adverse effects, and would likely be successful. State water quality and antidegradation policy would not be violated.	Changes in water quality or hydrology would be readily measurable, and some quality parameters would periodically be approached, equaled, or exceeded. Flows would be outside the range of historic conditions, and could include flow cessation or flooding. Extensive mitigation measures would be necessary and their success would not be assured. State water quality regulations and antidegradation policy may be violated.	Short-term - Following implementation activities, recovery would take less than one year Long-term - Following implementation activities, recovery would take longer than one year

TABLE 3: DEFINITIONS OF IMPACT THRESHOLDS (CONTINUED)

Impact Topic	Impact Threshold Definition				Duration
	Negligible	Minor	Moderate	Major	
Wetlands and floodplains	Wetlands or floodplains would not be affected or effects to the resource would be below or at the lower levels of detection. No long-term effects to wetlands or floodplains would occur and any detectable effects would be slight. No U.S. Army Corps of Engineers 404 permit would be necessary.	The effects to wetlands or floodplains would be detectable and relatively small in terms of area and the nature of the change. A U.S. Army Corps of Engineers 404 permit would not be required. No long-term effects to wetlands or floodplains would occur.	The alternative would result in effect to wetlands or floodplains that would be readily apparent, including long-term effects on wetland vegetation, such that a U.S. Army Corps of Engineer 404 permit could be required. Wetland or floodplain functions would not be affected in the long-term	Effects to wetlands or floodplains would be observable over a relatively large area, would be long-term, and would require a U.S. Army Corps of Engineers 404 permit. The character of the wetland or floodplain would be substantially changed.	Short-term - Following treatment, recovery would take less than one year Long-term - Following treatment, recovery would take longer than one year
Wildlife and wildlife habitats	Wildlife and their habitats would not be affected or the effects would be at or below the level of detection and would not be measurable or of perceptible consequence to wildlife populations.	Effects to wildlife and habitats would be measurable or perceptible, but localized within a small area. While the mortality of an individual animal might occur, the viability of wildlife populations would not be affected and the community, if left alone, would recover.	A change in wildlife and habitats would occur over a relatively large area. The change would be readily measurable in terms of abundance, distribution, quantity or quality of population. Mitigation measures would be necessary to offset adverse effects, and they would likely be successful.	Effects to wildlife would be readily apparent, and would substantially change wildlife populations over a large area in and out of the national park. Extensive mitigation would be needed to offset adverse effects, and its success could not be assured.	Short-term - Recovers in less than 1 year. Long-term - Takes more than 1 year to recover.

TABLE 3: DEFINITIONS OF IMPACT THRESHOLDS (CONTINUED)

Impact Topic	Impact Threshold Definition				Duration
	Negligible	Minor	Moderate	Major	
Endangered, threatened, and protected species, and critical habitats	No Effect: Impacts would not affect listed or protected species or designated critical habitat.	May Affect/Is Not Likely to Adversely Affect: Effects on special status species would be discountable (i.e., adverse effects are unlikely to occur or could not be meaningfully measured, detected, or evaluated) or completely beneficial.	May Affect/Likely to Adversely Affect: Adverse effects to a listed species might occur as a direct or indirect result of the proposed action and the effect would either not be discountable or completely beneficial. Moderate impacts to species would result in a local population decline due to reduced survivorship, declines in population, and/or a shift in the distribution; no direct casualty or mortality would occur.	Likely to jeopardize the continued existence of a species/Adversely modify critical habitat: Effects could jeopardize the continued existence of a listed or proposed species or adversely modify designated critical habitat within and/or outside the park boundaries. Major impacts would involve a disruption of habitat and breeding grounds of a protected species such that direct casualty or mortality would result in removal of individuals of a protected species from the population.	Plants Short-term - Recovers in less than 1 year. Long-term - Takes more than 1 year to recover. Animals Short-term - Recovers in less than 1 year. Long-term - Takes more than 1 year to recover.
Aquatic Life	Aquatic life would not be affected or the effects would be at or below the level of detection and would not be measurable or of perceptible consequence to aquatic populations.	Effects to aquatic life would be measurable or perceptible, but localized within a small area. While the mortality of an individual animal might occur, the viability of the population would not be affected and the community, if left alone, would recover.	A change in aquatic life would occur over a relatively large area. The change would be readily measurable in terms of abundance, distribution, quantity or quality of population. Mitigation measures would be necessary to offset adverse effects, and they would likely be successful.	Effects to aquatic life would be readily apparent, and would substantially change populations over a large area in and out of the national park. Extensive mitigation would be needed to offset adverse effects, and its success could not be assured.	Short-term - Recovers in less than 1 year. Long-term - Takes more than 1 year to recover.

TABLE 3: DEFINITIONS OF IMPACT THRESHOLDS (CONTINUED)

Impact Topic	Impact Threshold Definition				Duration
	Negligible	Minor	Moderate	Major	
Vegetation	Individual native plants may occasionally be affected, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.	Effects to native plants would be measurable or perceptible, but would be localized within a small area. The viability of the plant community would not be affected and the community, if left alone, would recover.	A change would occur to the native plant community over a relatively large area that would be readily measurable in terms of abundance, distribution, quantity or quality. Mitigation measures to offset/minimize adverse effects would be necessary and would likely be successful.	Effects to native plant communities would be readily apparent, and would substantially change vegetative community types over a large area, in and outside the park. Extensive mitigation would be necessary to offset adverse effects and their success would not be assured.	Short-term - Recovers in less than 1 year. Long-term - Takes more than 1 year to recover.
Cultural resources	The effect is at the lowest levels of detection – barely perceptible and not measurable.	For archeological resources, the impact affects an archeological site(s) with modest data potential and no significant ties to a living community's cultural identity. The impact does not affect the character defining features of a National Register of Historic Places eligible or listed structure, district, or cultural landscape.	For archeological resources, the impact affects an archeological site(s) with high data potential and no significant ties to a living community's cultural identity. For a National Register eligible or listed structure, district, or cultural landscape, the impact changes a character defining feature(s) of the resource but does not diminish the integrity of the resource to the extent that its National Register eligibility is jeopardized.	For archeological resources, the impact affects an archeological site(s) with exceptional data potential or that has significant ties to a living community's cultural identity. For a National Register eligible or listed structure, district, or cultural landscape, the impact changes a character defining feature(s) of the resource, diminishing the integrity of the resource to the extent that it is no longer eligible to be listed in the National Register.	Short-term - Effects on the natural elements of a cultural landscape may be comparatively short-term (e.g., 3 to 5 years) until new vegetation grows or historic plantings are restored. Long-term - Because most cultural resources are non-renewable, any effects on archeological, historic, or ethnographic resources, and on most elements of a cultural landscape, would be long-term.

TABLE 3: DEFINITIONS OF IMPACT THRESHOLDS (CONTINUED)

Impact Topic	Impact Threshold Definition				Duration
	Negligible	Minor	Moderate	Major	
Visitor use and experience	Visitors would not be affected or changes in visitor use and/or experience would be below or at the level of detection. Any effects would be short-term. The visitor would not likely be aware of the effects associated with the alternative.	Changes in visitor use and/or experience would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.	Changes in visitor use and/or experience would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.	Changes in visitor use and/or experience would be readily apparent and have important consequences. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.	Short-term – Effects occur only during project implementation activities. Long-term – Effects extend beyond project implementation activities.
Park operations	Park operations would not be affected or the effect would be at or below the lower levels of detection, and would not have an appreciable effect on park operations.	The effect would be detectable but would be of a magnitude that would not have an appreciable adverse or beneficial effect on park operations. If mitigation were needed to offset adverse effects, it would be relatively simple and likely successful.	The effects would be readily apparent and would result in a substantial change in park operations in a manner noticeable to staff and the public. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.	The effects would be readily apparent and would result in a substantial change in park operations in a manner noticeable to staff and the public and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, would be extensive, and their success could not be guaranteed.	Short-term – Effects occur only during project implementation activities. Long-term – Effects extend beyond project implementation activities.

AFFECTED ENVIRONMENT, EVALUATION METHODOLOGY, AND ENVIRONMENTAL CONSEQUENCES

Affected Environment

Detailed information on resources related to issues is identified prior to each impact topic analysis.

Park Description

Everglades National Park now encompasses 1,509,000 acres, comprising the southern tip of Florida (Figure 1). The park has been often referred to as a "river of grass, flowing imperceptibly from the hinterland into the sea".

The park contains an ecosystem that demonstrates the delicate balance within nature and the potential threats from human intervention. It is formed by a river of fresh water 6 inches deep and 50 miles wide. The topography is so subdued that a broad sheet of water slowly flows over and through the porous limestone bedrock on its way to the sea, rather than following well-defined drainages. Most of the park is actually covered with water during normal wet seasons, while dry winters cause fresh water to dwindle to a few open areas that become crowded with wildlife. Twenty threatened and endangered animal species reside in the park, including the American crocodile, Florida panther, Eastern indigo snake, mangrove fox squirrel, West Indian manatee, wood stork, snail kite, and bald eagle. The terrestrial and aquatic plant and animal communities have adapted to each other and to a climate of wet summers and dry winters. Although the park is often characterized as a water marsh, several distinct habitats exist within its boundaries, including: marine/estuarine, mangrove, coastal prairie, freshwater marl prairie, freshwater slough, cypress, hardwood hammock, and pineland. Over 350 bird species have been recorded, seven of which are rare or endangered.

Everglades National Park has the distinction of being a World Heritage Site and International Biosphere Reserve and is designated as a Ramsar Wetlands of International Importance.

As a tourist destination, drawing over 1,000,000 million visitors per year, the park is an important contributor to the economy of the local area. However, Everglades National Park is considered one of the most endangered national parks in the United States. A 93 percent drop in the population of wading birds nesting in the park, toxic levels of mercury found in all levels of the food chain, the die-off of seagrass in Florida Bay and the number of endangered species are all indicators of the serious problems this park faces in the future. The declines are largely a result of problems with the quality, quantity, timing, and distribution of water throughout the Everglades.

Project Site Description

The project area is located in the Flamingo developed area at the southern end of the park (Figures 1 and 2). The existing water treatment plant, distribution system, and percolation pond comprises approximately 650 acres and is within the coastal prairie and coastal hammocks, approximately 0.5-mile from the Florida Bay coastline. The existing freshwater wells and transmission line that supply the treatment plant comprise approximately 7 acres and are located in the freshwater marl prairie 16-miles northeast of the Flamingo developed site.

METHODOLOGY

GENERAL EVALUATION METHODOLOGY

Overall, the National Park Service based these impact analyses and conclusions on the review of existing literature and Everglades National Park studies, information

provided by experts within Everglades National Park and other agencies, professional judgments and park staff insights, the Florida state historic preservation office; interested local Tribes; and public input. For each impact topic, the analysis includes a brief description of the affected environment and an evaluation of effects. The impact analyses were based on professional judgment using information provided by park staff, relevant references and technical literature citations, and subject matter experts.

The impact analyses involved the following steps:

- Identify the area that could be affected.
- Compare the area of potential effect with the resources that are present.
- Identify the intensity (negligible, minor, moderate or major), context (local, parkwide, regional), duration (short or long-term), and type (direct or indirect) of effect, both as a result of this action and from a cumulative effects perspective. Identify whether effects would be beneficial or adverse. The criteria used to define the intensity of impacts associated with the analyses are presented in Table 3.
- Impact analyses included implementation of mitigation measures taken to protect resources. Examples of these measures are outlined in Table 4.

General Definitions

The following definitions were used to evaluate the context, intensity, duration, and cumulative nature of impacts associated with project alternatives:

Context is the setting within which an impact is analyzed, such as the affected region, society as a whole, the affected interests, and/or a locality. In this environmental assessment, the intensity of impacts are evaluated within a local (i.e., project area) context, while the intensity of the contribution of effects to cumulative impacts are evaluated in a regional context.

Impact Intensity- For this analysis, intensity or severity of the impact is defined as follows:

- Negligible - impact to the resource or discipline is barely perceptible and not measurable and confined to a small area.
- Minor - impact to the resource or discipline is perceptible and measurable and is localized.
- Moderate - impact is clearly detectable and could have appreciable effect on the resource or discipline.
- Major - impact would have a substantial, highly noticeable influence on the resource or discipline on a regional scale.

Duration

The duration of the impacts in this analysis is defined as follows:

- short term - when impacts occur only during construction or last less than one year; or
- long term - impacts that last longer than one year.

TABLE 4: MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

Potential Adverse Effect	Mitigation Measure or Best Management Practice
Direct effects from construction activities	Fencing of all construction areas to confine potentially adverse activities to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications, and workers would be instructed to avoid conducting activities beyond the fenced construction zone.
Erosion resulting from construction related surface disturbance	Standard erosion control measures such as sand bags would be used to minimize soil erosion. Erosion barriers would be inspected and maintained regularly to ensure effectiveness
Construction would affect areas previously undisturbed	Construction activities would take advantage, where possible, of sites where previous disturbance has already had adverse effects. Pipe bursting would be used to replace distribution lines, where possible, to avoid surface disturbance associated with open trenching. The existing wells and water transmission line would be capped and abandoned to avoid surface disturbance that would otherwise be associated with removal.
Contamination of soil by petrochemicals from construction equipment and maintenance of potable water treatment system	Areas used for equipment maintenance and refueling would be minimized and surface runoff in these areas would be controlled. Equipment would be checked frequently to minimize leaks and potential contamination. All chemicals used in the potable water treatment process would be transported, stored, and used following federal, state, and local regulations and standards.
Direct effects from construction and operation of rehabilitated potable water system on threatened and endangered species, wildlife and habitat	Pre-construction surveys would be conducted to avoid nesting sites of the federally listed, endangered American crocodile and the osprey (Florida species of special concern). The intake pipe at West Lake that provides surface water to the nearby comfort station would be boxed and screened to protect young crocodiles.
Direct effects from construction and operation of rehabilitated potable water system on the visitor experience and park staff	To lessen adverse effects on the visitor experience, construction information would be posted in strategic locations and made available on the park's website. Construction would utilize a rotation system to minimize disruption of visitor access and use of the Flamingo developed area. Where possible, all construction activities would be timed to avoid high visitor use periods. During the switch over from the existing water treatment system to reverse-osmosis, the park would either haul potable water or put a "boil water" order into effect to ensure the public's health and safety. Portable toilets would also be used to provide short-term sanitation needs during the switch over. An adequate number of licensed operators would ensure that new reverse-osmosis system performs in a manner to provide a reliable supply of potable water to visitors and park employees.
Discovery of unknown archeological resources or human remains	If previously undiscovered archeological resource are unearthed, work would be stopped in the area of any discovery and the park would consult with the National Park Service Southeast Archeological Center, the State Historic Preservation Officer and the Advisory Council on Historic Preservation, as appropriate. Because the project site is not in a high probability area, it is unlikely that any cultural resources would be encountered or impacted.

Direct versus Indirect Impacts

The following definitions of direct and indirect impacts were used in this evaluation:

- direct - an effect that is caused by an action and occurs at the same time and place
- indirect - an effect that is caused by an action but is later in time, or
- farther removed in distance, but still reasonably foreseeable.

Cultural Resource Analysis Method

Impacts to cultural resources are described in terms of type, context, duration, and intensity, as described above, which is consistent with the regulations of the Council on Environmental Quality (CEQ 1978) that implement the National Environmental Policy Act. These impact analyses also are intended to comply with the requirements of both National Environmental Policy Act and Section 106 of the National Historic Preservation Act. In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the National Historic Preservation Act (36 CFR Part 800, Protection of Historic Properties), impacts to cultural resources were identified and evaluated by:

- Determining the area of potential effects;
- Identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places;
- Applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and
- Considering ways to avoid, minimize, or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must also be made for affected cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the National Register. For example, this could include diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR Part 800.5, *Assessment of Adverse Effects*). A determination of *no adverse effect* means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

The Council on Environmental Quality regulations (CEQ 1978) and *Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001a) call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, such as reducing the intensity of an impact from major to moderate or minor. Any resulting reduction in intensity of impact because of mitigation, however, is an estimate of the effectiveness of mitigation under the National Environmental Policy Act only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Although adverse effects under Section 106 may be mitigated, the effect remains adverse.

A Section 106 summary is included in the impact analysis for cultural resources. The summary is intended to meet the requirements of Section 106 and is an assessment of the effect of implementing the alternative on cultural resources, based on the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Cumulative Effects Analysis Method

The Council on Environmental Quality regulations, which implement National Environmental Policy Act, require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

Cumulative impacts are considered for all alternatives and are presented at the end of each impact topic discussion analysis.

Cumulative effects were determined by combining the effects of the alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, or reasonably foreseeable future actions at Everglades National Park and in the area surrounding Flamingo. Other actions that have the potential to have a cumulative effect in conjunction with this project include:

- Any development actions by the National Park Service in the park; and
- Resource development on both public and private lands in the vicinity, such as agriculture, urban development, and other activities that could adversely affect hydrology and surface water quality.

Impairment Analysis Method

In addition to determining the environmental consequences of the preferred and other alternatives, the 2001 National Park Service Management Policies and DO-12, require analysis of potential effects to determine if actions would impair Everglades National Park resources.

The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid or minimize to the greatest degree practicable adverse impacts on park resources and values. However, the laws do give National Park Service management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given National Park Service management discretion to allow certain impacts within parks, that discretion is limited by statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute an impairment. However, an impact would more likely constitute an impairment to the extent it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the park's Master Plan or General Management Plan or other relevant NPS planning documents.

Impairment may result from National Park Service activities in managing the park, visitor

activities, or activities undertaken by concessionaires, contractors, and others operating in the park. A determination of impairment is made for each impact topic within each "Conclusion" section of this environmental assessment under "Environmental Consequences."

PUBLIC HEALTH AND SAFETY

Affected Environment

Approximately 150,000 visitors come to Flamingo each year. The potable water system supplies the needs of these visitors, concessionaires, and approximately 235 park staff residing at Flamingo. The 100,000 gallons per day produced by the water treatment plant supplies drinking and sanitation needs, restaurant and food preparation, laundry, and camping facilities. One purpose of the water system rehabilitation project is to assure that visitors and staff receive safe, high quality drinking water.

In the past, water quality testing has revealed that levels of trihalomethanes, copper and lead have occasionally exceeded national and state water quality guidelines. However, no visitor or staff member have reported becoming sick from using the water. To protect public health and safety, the park has issued a total of 28 “boil water” notices from 1998 to the date of this writing. Each boil order lasts a minimum of 2 days. These notices have been issued for high turbidity, low residual chlorine levels, and as precautionary measures in response to water line breaks (Everglades National Park, pers. comm. Quinn 2002).

The existing chloramine disinfection system was installed in December 2001, and is an upgrade to the previous chlorine disinfection system. The change in disinfectant was necessary due to the presence of trihalomethanes in Flamingo drinking water. Trihalomethanes are a potentially harmful group of compounds formed as by-products when chlorine reacts with natural and man-made chemicals (Florida Dept. of Environmental Protection 2001). Chronic exposure to elevated levels of trihalomethanes can result in liver, kidney or central nervous system problems, and may increase the risk of cancer (EPA 2002). The use of chloramine reduces the formation of trihalomethanes while providing adequate disinfection for drinking water.

In addition to disinfection byproducts, Flamingo drinking water has also tested positive for elevated concentrations of copper and lead. These metals are used during construction of water supply systems, and are also found in faucets and fittings. Copper is an essential nutrient, but exposure to elevated levels may cause gastrointestinal distress over the short-term, and liver or kidney damage over the long-term (EPA 2002). Lead in drinking water is unlikely to cause lead poisoning, but it adds to total exposure. Elevated lead concentrations can delay mental development in children and cause kidney problems and high blood pressure in adults (EPA 2002). Under EPA direction, Flamingo staff have instituted a corrosion control program to reduce the levels of these elements in the potable water system (Everglades National Park, pers. comm. Quinn 2002). All copper water piping has been replaced with polyvinyl chloride (PVC) and Aquamag® magnesium hydroxide is now used to precipitate metals from the water. A recent increased concentration in copper and lead was traced to installation of new faucets and fittings in employee housing. With use of the new fixtures and flushing of the system, it is unlikely that these elevated concentrations will persist (Everglades National Park, pers. comm. Quinn 2002).

The table below summarizes the EPA and Florida drinking water standards for the parameters of concern, and shows the results of implementation of the chloramines system and corrosion control program.

To provide a safe public drinking water supply, the staff at Flamingo have maintained water quality testing and implemented corrective actions when necessary. Other

required water quality testing is also routinely performed on the Flamingo potable water. To date, the park has not exceeded drinking water standards for other contaminants, including nitrogen, microbes, and residual chlorine.

TABLE 5: FLAMINGO DRINKING WATER PARAMETERS OF CONCERN

Parameter	EPA/FL Drinking Water Standard	Flamingo Average Prior to Program Implementation	Flamingo Average After Program Implementation
Trihalomethanes (total)	80 parts per billion	395 parts per billion (pre chloramines)	Less than 10 parts per billion (post chloramines)
Copper	1,300 parts per billion	1,500 parts per billion (pre Aquamag)	Retesting scheduled for June (post Aquamag)
Lead	15 parts per billion	19 parts per billion (pre Aquamag)	Retesting scheduled for June (post Aquamag)

Impacts to Public Health and Safety of Alternative A: No Action/Continue Current Management

Under the no action alternative, the existing 16-mile water transmission line would remain in place. This line currently loses 60,000 gallons per day from the volume withdrawn from the wells due to leakage. Where leakage occurs, the potential for microbes and pathogens to enter the line also exists. The risk of exposing visitors and staff to water borne pathogens would result in a short and long-term, minor, adverse effect to public health and safety.

The current water treatment system experiences a malfunction approximately once per month. During such a malfunction, the quality of treated water cannot be guaranteed, and the system may lose the ability to kill pathogens. The unreliability of the system results in short and long-term, minor, adverse effects on public health and safety.

The existing disinfectant system relies on the use of chlorine and ammonia gas to produce chloramine. Both chlorine and ammonia are toxic, especially when inhaled. The existing system includes an alarm system to warn of leaks. There have been 6 reported leaks over the past 10 years. In each case, the equipment vendor was contacted for repair of the disinfection unit. The risk of exposure to park staff who handle these agents produces direct, short and long-term minor adverse effects on public health and safety at Flamingo.

Continued use of water from the existing well to flush visitor toilets at the West Lake comfort station would not produce appreciable risks to public health and safety. The current system does not provide water to taps, and it is unlikely that humans would come in contact with water used to flush the toilets.

Cumulative effects. Visitors and staff at Flamingo are exposed to a variety of risks associated with sub-tropical environment. Backcountry hiking in areas with few services, interactions with wildlife, and boating activities can all expose visitors to risk. Other actions planned for the Flamingo area include realignment of the main road and installation of a new wastewater treatment plant. Little threat to health and safety would be generated during these projects, and they would both be likely to result in negligible to minor beneficial effects on public health and safety. In concert with existing conditions and other park plans, the no action alternative would not be likely to yield detectable effects on local public health and safety at Flamingo.

Conclusion. Under the no action alternative, the potential for water supply contamination through infiltration into piping and during system failure would persist. In addition, park staff would continue to be exposed to chlorine and ammonia gases. These would yield minor, short and long-term, adverse effects on public health and safety at Flamingo.

Impacts to Public Health and Safety of Alternative B: The Preferred Alternative

Implementation of the preferred alternative would change the source of Flamingo's water supply from "groundwater under the direct influence of surface water" to "groundwater." The potential for contamination of the groundwater source by pathogens found in surface water would be markedly reduced. In addition, the transmission line would no longer be used, eliminating the risk of infiltration of pathogens along the 16-mile corridor. By reducing these risks of exposure, short and long-term, minor, beneficial effects on public health and safety would result.

Installation of a reverse osmosis system would eliminate the need for chloramine treatment. Thus, park staff would no longer be exposed to chlorine and ammonia gas. However, the new system may require the addition of sulfuric acid and sodium hydroxide. Both of these agents are dangerous, especially when in contact with the skin. Responsible staff would be trained in the proper handling of these chemicals. Exchanging the use of one set of hazardous chemicals for another would result in short and long-term, minor, adverse effects to public health and safety at Flamingo.

The new water treatment system would use a water source within Flamingo, new saltwater pumps, new distribution system lines (as needed), and a more effective and efficient water treatment system. This would reduce the tendency of the system to malfunction and better protect public health and safety by assuring an uninterrupted flow of clean, safe drinking water. This would produce short and long-term, minor, beneficial effects on public health and safety.

Under the preferred alternative, a new pump would supply the visitor comfort station at West Lake with surface water from the lake for toilet flushing. This minor change in operations at this facility would not produce detectable changes on public health and safety.

Cumulative effects. The risks to visitors and staff posed by visiting and working in a subtropical environment would continue under the preferred alternative. Other actions planned for the Flamingo area include realignment of the main road and installation of a new wastewater treatment plant. Little threat to health and safety would be generated during these projects, and both are likely to result in some benefits to public health and safety. Implementation of the preferred alternative would contribute beneficially, with other park actions, to assure that visitors are not exposed to unnecessary risk in the Flamingo area. In concert with these other plans, the benefits of reducing exposure to pathogens and disinfectant byproducts would have negligible to minor beneficial effects on public health and safety at Flamingo.

Conclusion. Rehabilitation of the water system serving Flamingo would provide increased protection from water system contamination and enhance water treatment system reliability. This would result in short and long-term, beneficial effects of minor intensity that would extend to all local water users.

HYDROLOGY AND WATER QUALITY

Affected Environment

Regional Surface Waters

Historically, South Florida's freshwater supply came from the Kissimmee River basin, north of Lake Okeechobee. During the rainy season, the lake would overflow its shallow southern shore. This flow traveled slowly as a shallow river, 50 miles wide and 100 miles long, through the Everglades and into the coastal estuaries of Florida Bay and the Gulf of Mexico. The wetlands of the Everglades retain water, recharge aquifers, and form a mosaic of ponds, sloughs, sawgrass marshes, hardwood hammocks, and forested uplands. In and around the estuaries, freshwater mingled with salt to create habitats supporting mangroves

and nurseries for wading birds and fish. (South Florida Ecosystem Restoration Working Group, 1998).

The wet season begins with May thunderstorms. The summer landscape is almost completely covered with water. During the dry season (December to April), water levels gradually drop. The winter landscape is dotted with pools of water. Everglades plants and animals are adapted to alternating wet and dry seasons (NPS 1997).

Water management is the critical issue for the Everglades. Management efforts and development activities have dramatically changed the Everglades' water regime. Experts now believe that the Everglades receive too little water during the dry season and too much during the rainy season. Disruptions in the ebb and flow of water that supplies the "river of grass" have had significant effects on the ecosystem of the Everglades. By the mid 1800s, the Everglades was largely viewed as an unproductive swamp. Large-scale flood control, reclamation measures and water supply projects were undertaken to permit agriculture and development of the former marshland. The flows that once fed this unique system are now dramatically diminished by a network of canals, levees and water control structures (Carter 2001). Much of the freshwater that once flowed here is now used in agriculture and urban areas. At times the water control structures at the park boundary are closed, restricting flows during historical flood season. Or, alternatively, water control structures are opened, and unnaturally pent-up, human-managed floodwaters inundate during historically dry times (NPS 1997).

Regional Groundwater

The aquifers that underlie South Florida are made mostly of limestone and other carbonate rocks. These formations tend to dissolve over time in water, making them porous. Groundwater travels relatively quickly through these formations. These open aquifers are said to be "unconfined" and are recharged quickly by fresh surface water flows. Where limestone or other porous aquifers are near the coast, salty seawater can begin to move inward, infiltrating freshwater aquifers. This is particularly problematic where fresh groundwater is pumped to provide urban water supplies. Rapid development in South Florida has resulted in marine groundwater moving inward more than 15 miles in some places. Today, more than 3 million South Florida residents obtain their water supply from these shallow, freshwater aquifers (USGS 2001).

The seasonality of water availability in the Everglades has created an interplay of surface water and groundwater. During the summer rainy season, increased overland flow and stream flows recharge aquifers near the surface. During the dry winter, these superficial aquifers supply groundwater to support stream flows and provide vital moisture for wetlands and marshes.

Figure 4: Historic Freshwater Flows Through the Everglades.

Regional Water Quality

The Everglades are also affected by degraded water quality. Pollutants from urban areas and agricultural runoff (such as phosphorous and nitrogen), metals, and pesticides, have negatively affected water quality, native

vegetation, and animal populations. In park waters these excess nutrients destroy mats of composite algae called periphyton. These algae are the primary producers in the Everglades food web, providing both food and oxygen for small aquatic organisms. In the dry season, these algal mats also provide the critical moisture that enables many small organisms to survive the long months until rains come again (NPS 1997, Carter 2001).

Mercury pollution is a growing problem, and the source of this pollutant is largely atmospheric. In 1989, elevated levels were first detected in Everglades freshwater fish. Mercury occurs in the natural environment, but when converted to its organic form by sediment microbes, it is a dangerous contaminant. Tests have shown that the park's raccoons and alligators also contain elevated levels of this toxic metal in their systems. An endangered Florida panther, found dead in 1989, contained mercury concentrations that would be lethal to humans (NPS 1997).

Saltwater intrusion also changes water quality. When freshwater runs low, saline water penetrates aquifers and upsets the ecological balance. This allows salt-tolerant species to increase, and reduces the presence of species dependent on freshwater. In addition, changes in the quantity, quality, and timing of freshwater flows may have contributed to the equilibrium of Florida Bay, historically a brackish water system. Increased salinity and other ecological changes in the bay have caused large-scale die-off of coastal sea grasses, a vital habitat for bay wildlife. Suspended sediment has resulted in widespread algal blooms in western Florida Bay (NPS 1997).

Everglades Restoration Efforts

In response to public concern about development and continued ecosystem degradation, all levels of government have organized efforts to work towards a balanced and sustainable South Florida ecosystem. Several environmental and growth management laws have been passed in an attempt to address the needs of Everglades ecosystem restoration. Restoring and maintaining, at least in part, the natural hydrologic regimen of the area, using clean water is the most vital component of all restoration efforts.

The South Florida Ecosystem Restoration Task Force was formalized by Congress in the Water Resources Development Act of 1996. Membership includes federal, state, local and tribal governments. The task force coordinates over 200 projects that are part of restoring South Florida. The task force uses three goals: 1) "get the water right;" 2) restore, preserve, and protect natural habitats and species; and 3) foster compatibility of built and natural systems. The Department of the Interior, which chairs the Task Force, uses the Comprehensive Everglades Restoration Plan as the principal mechanism for restoring natural hydrologic functions and providing water supplies (Central and South Florida Comprehensive plan, undated; NPS 1997).

The National Park Service actively pursues ecosystem restoration efforts, both within the park and at the regional level. National Park Service staff are involved in establishing restoration goals, evaluating projects, conducting scientific research, and monitoring field conditions to measure progress (NPS 1997).

Project Area

Flamingo contains infrastructure development (including roads, electricity transmission, and water/wastewater facilities), visitor services and concessions, and park housing and operations. This area has largely been filled to accommodate the construction of existing facilities, and the whole area has been disturbed by past development activities. These human interventions have, to a degree, interfered with the natural water flow and hydrology regimen of the immediate vicinity.

The existing fresh water wells are located 16-miles northeast of Flamingo and are surrounded by the wetland habitat that

dominates Everglades National Park. The pump facility is accessed by a raised, dirt road, installed by the local electric provider to allow access to the transformers and transmission line also at this location. The 16-mile transmission line is buried along the full distance to the water treatment plant in Flamingo. The two wells draw freshwater from depths of 17 and 20 feet. The maximum current withdrawal rate is 160 gallons per minute, with a permitted maximum withdrawal rate of 212,300 gallons each day (S. Florida Water Mgt. District 2000). Currently, well water is treated with chloramine before it is placed in the transmission line. The discharge at the end of the transmission line is approximately 100 gallons per minute compared to 160 gallons per minute at the beginning of the transmission line. This difference represents a leakage loss of approximately 38 percent. The water that is lost to the wetland environment is treated and contains chlorine, phosphate, disinfection byproducts, and an anti-corrosion agent.

Waters that supply the shallow aquifers of the existing freshwater wells are the same surface water flows that define the hydrology of Everglades National Park. During the wet, summer months, surface flows seep into the porous rock layers beneath the soil surface. This inundation typically lasts about 6 months. During the dry, winter months, the wetland habitat is supplied with water by the storage capacity of these rock layers although water levels will be much lower than during the wet season. The rates of recharge and the ability of this system to supply freshwater for habitat and human use has not been defined. The amount of water in these aquifers would be dependent on climatic conditions and on the porosity of the aquifer formations in the immediate vicinity. The status of these wells, relative to potable water source regulations, is "groundwater under the direct influence of surface water." This designation mandates that this water be disinfected and treated by methods similar to those used to treat surface waters that serve as potable water supply. [For a discussion of drinking water quality at Flamingo, please see the Public Health and Safety section of this document.]

The Flamingo developed area is within coastal prairie habitat. Elevations in the developed area are slightly higher than those of the surrounding wetlands, ranging from approximately 4 to 7 feet above sea level. This area is not subject to the overland flows of surface water that define the Everglades wetland system.

Impacts to Hydrology and Water Quality of Alternative A: No Action/Continue Current Management

The facilities constructed at the existing freshwater well site have affected the hydrology of the immediate vicinity to some degree. The wells themselves remove water, year round, from the shallow aquifer. Because visitation at Flamingo is highest in the dry winter months, withdrawals are greatest during the period when groundwater is supplying water for the wetland environment. This withdrawal would likely result in a "cone of depression" where the water table is lowered in the vicinity of the wells. This possible effect has not been measured, and is difficult to quantity at this time. This possible effects from water withdrawal are anticipated to be adverse, localized, short and long-term, and of negligible to minor intensity.

The well site is accessed by a raised dirt road, which interferes with surface flows. The change in local sheet flow has resulted in the presence of a hardwood hammock that normally would not have existed there. Hammocks occur throughout the Everglades environment, and this occurrence represents a localized, long-term, minor adverse effect.

The transmission line, buried beneath the road shoulder, has been leaking approximately 60,000 gallons per day along the 16-mile distance to the water treatment plant. This water discharged into the environment contains chloramine and phosphates. These substances may affect water quality in the

immediate vicinity of the transmission line. However, given the 16-mile distance to the water treatment plant, it is unlikely that high concentrations of chemicals are discharged at any one location. Phosphate is bound to soil, and as a vital nutrient, it may contribute, at a negligible level, to nutrient pollution along the transmission line route. Chloramine, as a disinfectant, has the ability to kill microbes, and may upset the balance of the microbial community in the immediate vicinity of the transmission line. The possible effects of such contamination are difficult to quantify, and no survey of microbial activity or vegetative cover along the transmission line has been undertaken. Overall, this effect would be anticipated to be adverse, localized, negligible to minor, and long-term.

The use of well water for toilet flushing at the West Lake comfort station would continue unchanged. The rate of use of 100 gallons per day from the existing freshwater transmission line for the 6-month high visitation period would not result in measurable effects to hydrology of the project area.

Cumulative effects. The hydrology and water quality of the Everglades has been dramatically affected by large-scale water control projects, development of agriculture upstream, and nearby urbanization. The aquifers that supply visitors, concessionaires, and park staff are the same freshwater sources currently used by over 3 million South Florida residents. Continued use of this freshwater source for park purposes would contribute to freshwater drawdown and the resulting saltwater intrusion into these valuable water sources. However, given the relatively modest freshwater needs of Flamingo, compared to those of the Miami metropolitan area, this contribution would be of negligible intensity.

The park also plans to implement other actions coincident with the preferred alternative. The road within the Flamingo area would be realigned, and a new wastewater treatment plan would be installed. These actions, along with the preferred alternative, would produce short-term, adverse effects, localized within the developed area. The continued presence of roads and facilities would interfere, to some small degree, with the surface flow and hydrology essential to maintenance of the Everglades ecosystem. However, given the relatively small area developed at Flamingo, the contribution of these actions, together with those of the preferred alternative, would have negligible effects on the surface hydrology of the Everglades region.

Conclusion. Continuation of the no action alternative would result in localized, adverse effects to hydrology. Under this alternative, freshwater withdrawal from shallow aquifers continues (cone of depression), the access road to the existing well site would be maintained (interruption of sheet flow), and the leaky transmission line would be left in place (discharged of chemically treated water into wetland). These factors would yield direct, negligible to minor, short and long-term, adverse effects on hydrology within the project area.

Alternative A would not produce major adverse impacts on hydrology and water quality or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of hydrology and water quality or values as a result of the implementation of Alternative A.

Impacts to Hydrology and Water Quality of Alternative B: The Preferred Alternative

The preferred alternative includes installation of two new wells to meet the water supply needs at Flamingo. The location of the wells would be adjacent to the existing water treatment plant. These wells would be placed at a depth of between 50 and 150 feet. The final determination of well depth would be

made dependent on the quality of water obtained during pilot well test drilling. These depths of drilling would access the saltwater aquifer that lies below the freshwater aquifers accessed by the current wells. This vast saltwater aquifer results from seawater entering the deeper, porous rock strata underlying much of South Florida. Although the recharge rates for this aquifer vary and are not clearly defined, the strata in which it occurs are capable of conveying large quantities of water from the sea. This would result in a beneficial effect at the current freshwater well site, by removing the cone of depression. Eliminating freshwater drawdown would result in localized, short and long-term, beneficial effects of negligible to minor intensity.

Placing the new wells in the deeper, saltwater aquifer could produce adverse effects associated with drawdown from this aquifer system. These wells are expected to supply 300 gallons per minute of salt water to the new reverse osmosis system. However, because the saltwater aquifer is vast and recharged by seawater, these effects would be localized, short-term, and of negligible intensity.

Installation of the new saltwater wells would include a onetime purging of the new pump system. During this activity, approximately 2,000 gallons of raw saltwater would be drawn through the system and discharged into a nearby mangrove stand. Mangroves are found where freshwater mixes with saltwater. Discharge of this quantity of saltwater into a brackish water system would not likely result in detectable changes in hydrology or water quality.

The preferred alternative would retain the existing well site access road for maintenance of the electrical transmission station. Therefore, the adverse effects on local surface water flows and formation of the artificial hardwood hammock would be as discussed for the no action alternative – localized, long-term, minor, and adverse.

Implementation of the preferred alternative would abandon in place the 16-mile transmission line from the freshwater wells to the water treatment plant. Because this line currently leaks treated water into the environment, ceasing its use would be of benefit in the immediate vicinity of the line. By removing exposure to chemically treated water, a long-term, negligible to minor beneficial effect would accrue along the line route.

The West Lake comfort station toilets would be supplied by installation of a pump to supply non-potable freshwater from the lake for flushing. This would require approximately 100 gallons per day for the 6-month high visitation period. West Lake has over 3 square miles of surface area, contains any thousands of acre-feet of water, and is recharged by the hydrologic regimen of the Everglades region. Use of the modest 100 gallons per day to supply visitor services would not be likely to affect the local hydrology at West Lake.

Installation of the new reverse-osmosis system would create a brine discharge to the percolation pond. Under the preferred alternative, approximately 180,000 gallons per day of high salinity water would flow into the percolation pond. The salinity of this water would be approximately 60,000 parts per million of total dissolved solids. Park staff installed a test well just east of the percolation pond to measure salinity conditions in the area likely to be affected by the infiltration plume. Total dissolved solids were found to be 40,000 parts per million at the site. (By comparison, seawater contains approximately 35,000 parts per million total dissolved solids.)

The State of Florida has classified groundwater and associated uses based on water quality standards. In an unconfined aquifer such as those found in South Florida, this classification is G-III. All discharges into this G-III aquifer are governed by Section 62-520.400, which restricts contamination by harmful, toxic, dangerous, or nuisance substances (Florida Dept. of Environmental Protection 1996). All appropriate brine quality

testing and state permits would be obtained by the park prior to discharge of the reverse-osmosis brine into the percolation pond.

During infiltration, water from the percolation pond would move toward Buttonwood Canal, lying approximately 500 feet to the east. As the flow moves through shallow soils, evaporation could increase salinity of the flow as it moves toward the canal. The Buttonwood Canal was constructed for boat access, and formerly opened to Florida Bay approximately 2,000 feet south of the percolation pond site. The canal has been plugged to prevent unnatural drainage of fresh and brackish water into Florida Bay. It is anticipated that a groundwater plume of high salinity would affect plant life by causing a localized shift toward more salt-tolerant species, over an area of approximately 5 to 10 acres. Upon reaching Buttonwood Canal, the high salinity waters would mix with brackish water. Changes in salinity of the infiltrating water from the percolation pond would result in minor, long-term, adverse, localized effects to the water quality and hydrology.

Cumulative effects. The natural hydrology regimen and historic water quality of the Everglades have been altered by water control projects, upstream agriculture, and population growth and its associated urbanization. The aquifers that supply Flamingo facilities are the same freshwater sources currently used by over 3 million South Florida residents. By discontinuing withdrawal of freshwater from these shallow aquifers, the park would make a beneficial contribution to reducing drawdown and relieving saltwater intrusion into valuable aquifers. However, given the relatively modest freshwater needs of Flamingo, compared to those of the Miami metropolitan area, this contribution would be of negligible intensity.

Other activities within the project area would occur coincident to the implementation of the preferred alternative. These activities would include the Flamingo road realignment and installation of a new wastewater treatment plant. These actions along with those associated with the preferred alternative would produce short-term disturbance, localized within the developed area. The continued presence of roads and facilities would interfere to some small degree with the surface flow and hydrology essential to maintenance of the Everglades ecosystem. However, given the relatively small area developed at Flamingo, the contribution of other management activities, in concert with those of the preferred alternative, would have negligible effects on the surface hydrology of the Everglades region.

Conclusion. Under the preferred alternative, both beneficial and adverse effects to water quality and hydrology would result. Cessation of freshwater aquifer withdrawals would contribute beneficially, but negligibly, to reduced usage of valuable freshwater supplies. Abandonment of the existing leaky transmission line would also result in a beneficial effect of minor intensity as treated water would no longer be discharged into wetlands. Other effects on hydrology and water quality of the project area would be adverse, negligible to minor, and both short and long-term. These adverse effects include continued presence of the well site access road, use of surface water from West Lake for toilet flushing, and potential generation of a high salinity groundwater plume from the percolation pond to Buttonwood Canal.

Alternative B would not produce major adverse impacts on hydrology and water quality or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of hydrological and water quality resources or values as a result of the implementation of Alternative B.

WETLANDS AND FLOODPLAINS

Affected Environment

The Flamingo area lies within the 100-year floodplain of hurricanes and tropical storms that occur in Florida Bay to the south, and is surrounded by the wetland habitats of the Everglades and coastal estuary. The hydrology of the Flamingo area is described in the Hydrology and Water Quality section of this document.

Wetlands. The project area includes three distinct habitats, two of which are classified as wetlands. The existing freshwater well site, 16-miles northeast of the water treatment plant, is located in the freshwater Everglades wetland, dominated by surface flows during the summer rainy season. The water treatment plant and percolation pond are located on the coastal prairie, which is not a wetland, but is included in the designated floodplain. At the edge of the project area, along the bay and waterway, are stands of mangroves in the vegetated estuarine wetland.

The National Park Service has directed park staff to protect wetlands from adverse impacts wherever practicable (Director's Order 77-1). The National Park Service must avoid direct or indirect adverse impacts on wetlands, or where impacts cannot be avoided, degradation or loss must be minimized by every practicable effort. Any actions that may reduce or degrade wetlands are governed by the Clean Water Act and Rivers and Harbors Act (33 US Code Parts 1344 and 403, respectively) and are regulated by the U.S. Army Corps of Engineers and the Environmental Protection Agency.

Floodplains. The Flamingo area lies at an elevation of less than 10 feet above sea level. There is little change in topography across the project area. The water treatment plant, percolation pond, transmission, and distribution network, as well as the supply wells and transmission system are located within the coastal zone 100-year floodplain. This area would be likely to be inundated by floodwater in the event of a hurricane or major tropical storm. Facilities located in these coastal high-hazard areas are required to meet building codes and Monroe County floodplain management standards.

Since the establishment of Everglades National Park in 1947, the parks mission has been to preserve resources inclusive of hydrological conditions within the park and the South Florida ecosystem. Subsequent agricultural and residential development surrounding the park has increased over the years and substantially changed the hydrology. South Florida's infrastructure of canals, levees and water control structures were built to control flooding and move water through agricultural and developed areas.

The Statement of Findings for Executive Order 11988 "Floodplain Management" is attached in Appendix A of this document.

Impacts to Westland and Floodplains of Alternative A: No Action/Continue Current Management

Wetlands

Under the no action alternative, the existing wells would continue to draw down freshwater from the wetlands surrounding the well site. The 16-mile transmission line would remain in use and would discharge treated water along its route to the water treatment plant at Flamingo. The elevated road that provides access to the well site and electrical transformer units would remain in place, hampering local surface flows during the summer rainy season.

In addition to continuing use of the current wells and transmission line, emergency repairs to the system are required approximately twice per year. In the event that excavation and disturbance were needed in wetlands, U.S. Army Corps of Engineers permitting would be required (Permit 12 for utility line maintenance). Excavation and reclamation

efforts needed to perform needed repairs would result in short-term, localized, negligible to minor adverse effects to wetlands in the vicinity of line repairs.

The specific hydrology of the project area has not been surveyed, nor have vegetation transects been performed to determine the precise effects on the wetland environment resulting from the existing system. However, given the longstanding presence of the existing system, it is likely that continuing the current management action would result in short and long-term, negligible to minor, localized adverse effects to the wetlands of the project area.

Floodplains

The existing facilities at Flamingo are located in the 100-year floodplain out of necessity. All locations in this area would be subject to flooding during hurricanes or large tropical storm events. The dispersed nature of the existing water system components increases the risk that damage to the system would occur in the event of a inundation. If flooded, deteriorated pipes would be exposed to flood waters, which could contaminate the drinking water supply. Flood damage risks would increase through loss of function and time necessary to restore a fully functioning water supply.

The water treatment plant building lies approximately 500 feet west of Buttonwood Canal and is elevated to 11 feet above base flood elevation. The structure is also protected against high winds in accordance with building codes. In the event of a hurricane or tropical storm threat, park staff implement the Everglades National Park Hurricane Plan to minimize hazards by providing a warning and evacuation plan. The primary flood risks therefore include facility function and service outages for potable water. This increased exposure to flood risk represents a long-term, minor, adverse effect on the floodplain of the project area.

Cumulative effects. Under current management, the existing water system would contribute to adverse effects on wetlands and floodplains in South Florida. Because regional impacts to wetlands have been due to large-scale water control projects and the presence of agriculture north of the park, the contribution of the existing water treatment system would be negligible. Urban development in South Florida has resulted in construction of many facilities and communities within the 100-year floodplain. In view of this trend, the contribution of the existing Flamingo water treatment system to floodplain effects would also be minimal.

Other plans for the Flamingo area include realignment of the road and installation of a new wastewater treatment system. Neither of these projects would increase impervious areas of the floodplains or affect the wetlands surrounding the Flamingo area. The no action alternative, in combination with other development plans at Flamingo would not contribute to cumulative effects on regional wetlands and floodplains.

Conclusion. Continuation of the no action alternative would result in localized, adverse effects to the wetland environment within the project area. Under this alternative, withdrawal from shallow freshwater aquifers would continue, the access road to the existing well site, which impedes surface flows, would be maintained, and the leaky transmission main would be left in place. These factors would yield direct, negligible to minor, short and long-term, adverse effects on wetlands within the project area.

Water supply components located within the floodplain would experience continued increased risk of inundation during hurricanes and tropical storms, resulting in long-term, minor, adverse effects on the floodplain of the project area.

Alternative A would not produce major adverse impacts on wetland or floodplain resources whose conservation is (1) necessary

to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of wetland or floodplain resources as a result of the implementation of Alternative A.

Impacts to Wetlands and Floodplains of Alternative B: The Preferred Alternative

Wetlands

Under the preferred alternative, the existing freshwater wells would no longer be used and the 16-mile transmission line would be purged and abandoned in place. By eliminating freshwater drawdown and discharge of treated water, a beneficial effect would accrue to the wetland environment. This benefit would be localized, negligible to minor in intensity, and both short and long-term. The elevated road that provides access to the well site and electrical transformer units would remain in place, hampering local surface flows during the summer rainy season. This would leave in place the minor, long-term, adverse effect caused by disturbance of sheet flow.

The periodic emergency repairs needed to maintain the 16-mile line would no longer be required, and disturbance along this corridor would be eliminated. This would provide benefits by removing disturbance in the wetland and yield both short and long-term, negligible to minor, localized effects of avoiding excavation and reclamation efforts.

Installation of the new saltwater wells would include a purging of the new pump system and discharge of approximately 2,000 gallons of raw saltwater into nearby mangroves. Discharge of this quantity of saltwater into a brackish water system would not likely result in detectable changes in the mangrove wetland.

Operation of the reverse-osmosis system would create a high salinity brine (40,000 parts per million total dissolved solids) discharge to the percolation pond. High concentrate salt reject water would percolate into the ground at a rate of about 180,000 gallons per day. Groundwater adjacent to the percolation pond was measured and found to have 40,000 parts per million saline concentration, or 67 percent of that present in the brine. During percolation and infiltration, the high salinity plume would move eastward toward Buttonwood Canal. It is anticipated that this would cause a localized shift toward more salt-tolerant species in an area of 5 to 10 acres between the percolation pond and the canal. These changes would result in minor, long-term, adverse, localized effects to the wetlands within the project area.

Floodplains

The risk of flooding is reduced by centralizing the water treatment facilities. The existing elevated water treatment building would be utilized. This would attain the widest range of beneficial effects to the environment and floodplain protection. Although the preferred alternative includes minimal surface disturbance within the 100-year floodplain, all disturbance would be reclaimed. There would be no increase in impermeable surfaces that would increase stormwater runoff. As a result, there would be negligible, short-term adverse effects on the floodplain of the project area.

Flood mitigation for the new water supply wells would assure that floodwaters do not enter or accumulate within the system and contaminate the potable water supply. The new wells would be constructed to withstand high velocity flow, wave action, and debris effects. Feed lines from the wells to the treatment plant would be placed above the flood elevation or embedded to minimize damage during flooding. The National Park Service would continue to operate these facilities using the Everglades National Park Hurricane Plan to reduce the threat to life and property.

Cumulative effects. Implementation of the preferred alternative would contribute in a negligible way to both beneficial and adverse effects on wetlands and floodplains in South Florida. The regional effects to these resources are the result of large-scale manipulations, longstanding agricultural practices, and development within floodplains. The beneficial aspects of abandoning the existing wells and transmission main would be limited to the immediate area surrounding these facilities. The adverse effects of the brine discharge would also be localized to the area between the percolation pond and Buttonwood Canal.

Other plans for the Flamingo area include realignment of the road and installation of a new wastewater treatment system. Neither of these projects would increase impervious areas of the floodplain or affect the wetlands surrounding the Flamingo area. The no action alternative, in combination with other development plans at Flamingo would contribute negligibly to regional effects on wetlands and floodplains.

Conclusion. Under the preferred alternative, the new water system would contribute both beneficial and adverse effects to wetlands and floodplains the project area. Eliminating freshwater withdrawal at the existing wells and abandoning the 16-mile transmission main would yield negligible to minor, beneficial effects localized to wetlands at the well site and along the utility corridor. Because the access road would remain in place, an adverse, long-term, minor effect would continue. Purging the new system and releasing 2,000 gallons of saltwater into nearby mangroves would produce an adverse, but negligible effect in the mangrove wetland. Brine infiltration from the percolation pond would increase salt-tolerant species and produce minor, long-term localized, adverse effects over an area of approximately 5 to 10 acres. Under the preferred alternative, water supply components would be centralized, reducing the flood hazard. This would result in long-term, minor beneficial effects to the floodplain of the project area.

Alternative B would not produce major adverse impacts on wetland or floodplain resources whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of wetland or floodplain resources as a result of the implementation of Alternative B.

WILDLIFE AND WILDLIFE HABITATS

Affected Environment

The warm wet climate, abundant vegetation and unique habitats found within Everglades National Park support over 40 species of mammals, 347 species of birds, 50 species of reptiles (including 27 snakes and 16 turtles), and 15 species of amphibians. Only a portion of these species commonly occur in habitats present within the project area. These habitats consists mainly of the coastal prairie in the Flamingo area, the freshwater marl prairie surrounding the existing wells and lying adjacent to the transmission line, and to a lesser extent, mangrove stands and salt marshes interspersed throughout. For a more detailed description of the vegetative habitats within the affected environment refer to the vegetation section. Species associated with, or commonly observed in these habitats are included in Table 6.

Special Use Within the Project Area.

The road corridor from the main park entrance to Flamingo provides an artificial high ground where wildlife, in particular marsh rabbit and raccoon tend to congregate and travel on. Unfortunately, these activities conflict with the main human use of the corridor, namely driving, and incidents of wildlife mortality due to vehicular traffic are not uncommon. Herpafauna, reptiles and amphibians, are

TABLE 6: WILDLIFE COMMON WITHIN THE AREA OF ANALYSIS

Common Name	Scientific Name
Mammals	
Opossum	*Didelphis marsupialis*
Raccoon	*Procyon lotor*
Bobcat	*Lynx rufus*
Rabbit	*Sylvilagus* sp.
Birds	
Brown pelican	*Pelecanus occidentalis*
Double-crested cormorant	*Phalacrocorax auritus*
Great blue heron	*Ardea herodias*
Snowy egret	*Egretta thula*
White ibis	*Eudocimus albus*
Turkey vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
Bald eagle	*Haliaeetus leucocephalus*
Eastern screech-owl	*Otus asio*
Great egret	*Casmerodius albus*
Glossy ibis	*Plegadis falcinellus*
Wood stork	*Mycteria americana*
Little blue heron	*Egretta caerulea*
Tricolored heron	*Egretta tricolor*
Roseate spoonbill	*Ajaja ajaja*
Cattle egret	*Bubulcus ibis*
Reptiles	
Green anole	*Anolis carolinensis*
Brown anole	*Anolis sagrei*
Southeastern five-lined skink	*Eumeces inexpectatus*
Ground skink	*Scincella lateralis*
Eastern garter snake	*Thamnophis sirtalis*
Peninsula ribbon snake	*Thamnophis sauritus*
Eastern mud snake	*Farancia abacura*
Corn snake	*Elaphe guttata*
Florida cottonmouth	*Aghistrodon piscivorus*
Dusky pigmy rattlesnake	*Sistrurus miliarius*
Eastern diamondback	*Crotalus adamanteus*
Amphibians	
Florida cricket frog	*Acris gryllus*
Green treefrog	*Hyla cinerea*
Squirrel treefrog	*Hyla squirella*
Little grass frog	*Pseudacris ocularis*
Eastern narrow-mouth toad	*Gastrophyne carolinesis*
Southern leopard frog	*Rana utricularia*

Source: http://www.nps.gov/ever/eco/lists.htm and Snow 2002

particularly vulnerable to these incidents due to their generally low profile, affinity to bare basking spots, and relative slow movement (Everglades National Park Pers. comm. Snow 2002).The following areas are adjacent to the project area:

- **Paurotis Pond** - spoonbills and wading birds occur here year-round, a wading bird rookery is located on the pond with wood storks, white ibis, spoonbills, great egrets, and others nesting in season (late winter, early spring). Paurotis Pond is located about 0.1 mile from the main park road (Snow 2002)

- **Nine Mile Pond** - Cormorants, grebes, herons, egrets, and ibises, occasional snail kites, wood storks and spoonbills, royal and caspian terns, also eagles and osprey are attracted to the pond, especially in winter. The island of dense trees between the main road and the parking lot has been used as a roost by white-crowned pigeons. Depending on the year, white-crowned pigeons (a state listed species of special concern) can be seen along the road from Nine Mile Pond to Flamingo (Snow 2002)

- **West Lake** - wintering ducks, especially American coots use the lake (Snow 2002).

- **Mrazek Pond** – is located along the main park road near Coot Bay Pond. Most of the year only a few ducks and wading birds are observed on the pond. However, for few days during some winters, large numbers of wading birds, including spoonbills and wood storks, can be seen, attracting large numbers of tourists at the roadside (Snow 2002).

- **Coot Bay Pond** – is highly variable, it may have coots and wading bird concentrations in some years and black and yellow-crowned night-herons roost here with some regularity. Coot Bay Pond is also along the main park road (Snow 2002).

- **Flamingo Wastewater Treatment site (including ponds and adjacent areas)** - depending on the time and the year, coot, osprey, white-crowned pigeon, warblers, red-shoulder hawk, anhinga, sora rail, a variety of shorebirds including killdeer and avocet, and other transient species may be present (Snow 2002).

Impacts to Wildlife and Wildlife Habitats of Alternative A: No Action/Continue Current Management

The implementation of the no action alternative would not result in any changes to the current water collection, treatment, or distribution systems. Wildlife has habituated to the current systems, including the leaking transmission and distribution lines, and there are currently no known associated adverse impacts.

Maintenance and repair of the existing wells requires park staff to regularly travel to and from the well site by automobile. As mentioned in the affected environment, traffic poses a threat to wildlife that uses the road corridor. The threat caused by a single vehicle used by park staff, would be negligible, long-term and adverse, but worth noting.

Cumulative Effects. Daily vehicular traffic on the main park road, including visitors and park staff, poses a negligible to minor, long-term, adverse, cumulative impact to wildlife that uses the road corridor. Mortalities of individual animals would continue to occur, but the viability of the population or community would not be affected.

Conclusion. Park staff travel to and from the well site would continue as a result of implementing the no action alternative, and the negligible, long-term, adverse effects associated with incidents between vehicles and wildlife would continue.

Alternative A would not produce major adverse effects on wildlife or wildlife habitat whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of wildlife or wildlife habitat resources or values as a result of the implementation of Alternative A.

Impacts to Wildlife and Wildlife Habitats of Alternative B: The Preferred Alternative

Activities that would potentially impact wildlife and/or wildlife habitat associated with the preferred alternative include drilling new wells in the vicinity of the water treatment plant, replacement of the distribution lines (as needed), and the elongation of the existing concentrate pipeline (by 300 feet) running from the water treatment plant to the percolation pond. The majority of the area that would be impacted by these activities is located on fill and has previously been disturbed and/or developed. As such, effects from the physical intrusion of machinery and personnel would be minimal. However, noise produced by drilling equipment, trucks and other machinery may cause disturbance to nesting habitat, foraging habitat, and wading and shore birds, and may result in local avoidance of the disturbed areas. Osprey, in particular, have been observed abandoning nests within the Flamingo area, possibly in reaction to anthropogenic (human caused) disturbances. Effects resulting from noise and physical intrusion of machinery and personnel would be considered direct, short-term, minor, and adverse. It would, however, be necessary to work outside the nesting season.

Another possible, direct, impact to wildlife would result from the mowing of the percolation pond located near the existing wastewater treatment plant (Figure 2). Under the preferred alternative park staff would need to remove vegetation growing within and around the percolation pond on a regular basis in preparation for the concentrate pipeline installation, and during the eventual utilization of the pond. This maintenance operation would require the use of machinery, and as a result would produce a negligible to minor, long-term, adverse impact. This impact would be associated with the physical intrusion of park personnel (which currently occurs during other maintenance operations), and noise produced during mowing. These disturbances may elicit wildlife to leave or avoid the area, but pre-activity wildlife use would resume following these episodes.

As a consequence of the preferred alternative, a steady 300,000 gallons of water per day would be drawn within the vicinity of the existing water treatment plant. A shallow cone of depression may result from this activity, which could in turn have a slight adverse effect on foraging habitat in the area. However, water being drawn by these wells would be supplied by seawater infiltration, and not a limited aquifer, thus greatly decreasing the likelihood that drawdown from the wells would have any impact on wildlife or wildlife habitat.

The West Lake comfort station currently draws chemically treated but unfiltered water from the existing transmission line for use in flushing toilets. Under the preferred alternative this would no longer be an option, so surface water from West Lake would be used for this activity. Approximately 100 gallons per day (during high visitation) would be drawn from the lake resulting in negligible, long-term, adverse effects to wildlife and habitats in and around West Lake. The consumption of 100 gallons per day from the lake would not be noticeable, and the only measurable effects would be associated with the installation of the collection system, including a small pump, a 50 foot pipe to the lake and a retaining box (made of wire mesh) preventing debris and wildlife from entering

the pipe. These effects would last only as long the installation activities, would not result in a noticeable change in the wildlife community and therefore be considered short-term, negligible, and adverse.

A beneficial result of the preferred alternative would be a negligible decrease in transportation, and transportation-related wildlife mortality. Under existing conditions, regular trips by park staff to and from the existing wells (32 miles round trip), for maintenance and monitoring, could possibly result in incidents of accidental collision with wildlife. This threat would be alleviated following implementation of the preferred alternative.

Cumulative Effects. Other activities within the project area would occur coincident to the implementation of the preferred alternative. These activities would include, but not be limited to, the proposed Flamingo road realignment, and the proposed Flamingo and Pine Island wastewater treatment plant upgrades. All of these activities along with those associated with the preferred alternative would produce disturbances, mainly noise and those associated with the physical intrusion of machinery and personnel. These would result in minor, long-term, adverse cumulative effects to wildlife and wildlife habitats.

As stated above the decrease in traffic that would occur in the preferred alternative would not be substantial and when factored into the total number of vehicles traveling to and from Flamingo on the main park road it would not be noticeable. Cumulative effects associated with the incremental loss of one automobile traveling to and from the wells would be negligible, but beneficial.

Conclusion. The preferred alternative would result in short and long-term, negligible to minor, adverse effects on wildlife and wildlife habitats. These effects would be largely due to disturbances related to drilling new wells in the vicinity of the water treatment plant, replacement of the distribution lines (as needed), and the also elongation of the existing concentrate pipeline (by 300 feet) running from the water treatment plant to the percolation pond. Negligible to minor, long-term, adverse effects would also occur while mowing of the percolation pond is taking place. Effects in both instances would be attributed to the physical intrusion of personnel and machinery and the noise they produce.

Alternative B would not produce major adverse effects on wildlife or wildlife habitat whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of wildlife or wildlife habitat resources or values as a result of the implementation of Alternative B.

ENDANGERED, THREATENED OR PROTECTED SPECIES AND CRITICAL HABITATS

Affected Environment

Everglades National Park provides habitat for a variety of federally listed endangered and threatened species. In the four South Florida parks - Big Cypress, Everglades, Biscayne, and Fort Jefferson – 16 endangered and 6 threatened wildlife species are found (NPS 1997). In addition, one federally listed threatened plant, Garber's spurge, is also found in Everglades National Park. Of the listed species, it is possible that the project area may be visited or utilized by nine listed wildlife species (Table 7).

The State of Florida has compiled the federal and state listed species into a comprehensive listing. This information can be accessed at the Florida Fish and Wildlife Conservation Commission website at

http://floridaconservation.org/pubs/endanger.html. Further information on all endangered species can be found at the U.S. Fish and Wildlife website at http://endangered.fws.gov/.

The Flamingo developed area contains infrastructure, park housing, and visitor facilities. This area is utilized by over 150,000 visitors and is home to park staff. Utilization of this area by endangered and threatened species is limited by the intensity of human activity and the nature of the site as a disturbed and developed area. Actions that would be performed under either alternative would be confined to previously disturbed areas.

American crocodiles are the most widely distributed New World crocodile, ranging from southern Florida to northern South America. Their habitat consists of freshwater or brackish water coastal inlets, lagoons, and mangrove swamps. This species was listed as endangered in 1975, and has designated critical habitat within Everglades National Park. The American crocodile is a large species, with males reaching lengths of 15 to 18 feet (Ross, undated). Crocodiles feed at night, primarily eating fish, and other aquatic species including turtles and crabs. They also take birds. The American crocodile is not considered especially aggressive or dangerous to humans (Britton 2002).

Crocodiles utilize holes or mounds for nesting and can use a variety of environments to construct their nests. The number of eggs in a nest ranges from the 20 to over 60. The total population of American crocodiles is not known. The Florida population is estimated to be 400 to 500 animals. Crocodiles have become endangered due largely to hunting and loss of habitat (destruction of coastal mangroves and beach development).

Crocodiles are found in the marine and brackish waterways of the project area. They forage and nest in the vicinity of the proposed project area. Soil disturbance tends to attract crocodiles seeking nesting sites. Any activities that would attract crocodiles to areas of maintenance activities would require mitigation to prevent entrance to areas of high human use (Everglades National Park, pers. comm. Snow 2002). Crocodiles nest during the dry season to avoid exposing eggs to the high water table associated with rainy weather (Britton 2002).

TABLE 7: FEDERALLY LISTED ENDANGERED, THREATENED, AND CANDIDATE SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA

Common Name	Scientific Name	Status
INVERTEBRATE		
Stock Island tree snail	*Orthalicus reses reses*	Threatened
REPTILES		
American crocodile	*Crococylus acutus*	Endangered
Eastern indigo snake	*Drymarchon corias couperi*	Threatened
BIRDS		
Wood stork	*Mycteria americana*	Endangered
Cape Sable seaside sparrow	*Ammodramus maritime mirabilis*	Endangered
Everglades snail kite	*Rostrhamus sociabilis plumbeus*	Endangered
Bald eagle	*Haliaeetus leucocephalus*	Threatened
MAMMALS		
Mangrove fox squirrel	*Sciurus niger*	Candidate
Florida panther	*Felis concolor coryi*	Endangered
Florida manatee	*Trichechus manatus latirostris*	Endangered

The **Eastern indigo snake** is a large, non-poisonous snake that may reach up to 8 feet in length. The snake gets its name from its shiny, blue-black color. Its diet consists mainly of other snakes, amphibians, small mammals, and occasionally birds and turtles.

The species occurs throughout Florida and along the coastal plain of Georgia. Indigo snakes prefer well-drained, sandy soils, and often use tortoise burrows for nesting. The range of these snakes varies by season and prey availability, and may cover from 12 to 266 acres (USFWS 1991).

The decline in Eastern indigo snake populations is attributed to loss of habitat to agriculture, and also to collecting for the pet trade. The docile nature of this animal has made it desirable as a pet (USFWS 1991). The species has also suffered from mortality during gassing of gopher tortoise burrows for rattlesnake collection. The species was listed in 1978, and has no designated critical habitat.

Little is known about the specific habits and niche of the Eastern indigo snake in Everglades National Park. The species is generally found in and near hardwood hammocks, and has shown no preference for disturbed sites. To avoid trapping these animals, it is best that pit excavation be avoided near hammocks, and that any open excavation be covered overnight (Everglades National Park, pers. comm. Snow 2002).

Wood storks are large, long-legged wading birds, standing about 50 inches tall, with a wingspan over 60 inches. They have white plumage and a short, black tail. Their bill is black, thick at the base and curved. These birds eat small fish, and probe with their bills for their food in shallow water no more than about 10 inches deep. They feed in freshwater marshes, tidal creeks, and brackish wetlands, and nest primarily in cypress or mangrove swamps (USFWS 1996).

Wood storks use thermal drafts for soaring, and may travel 80 miles from nest to feeding areas. These birds are highly social and nest in large rookeries and feed in flocks. They are long-lived and first breed at 4 years old. The current world population is estimated at 11,000 birds. Their U.S. range consists of parts of Florida, Georgia and South Carolina. In South Florida, nesting occurs as early as October, with young leaving the nest in February or March. It is estimated that two fledglings need almost 400 pounds of fish during this time. The decline in wood stork populations is attributed mostly to loss of habitat by destruction of wetlands and control of flows that created the Everglades (USFWS 1996).

Wood storks are known to forage in the project area, and a nesting colony has been established adjacent to the main road to Flamingo at Paurotis Pond. The water transmission line also passes along this road corridor. After several years without successful rearing of young, it appears that the Everglades colonies, including the population at Paurotis Pond, are producing offspring (Everglades National Park, pers. comm. Snow 2002).

Cape Sable seaside sparrows are small, olive-brown birds about 5 inches long. They are distributed over a large portion of South Florida, with the largest population in the Big Cypress swamp and near Taylor Slough. These birds were discovered in the early 1900s on Cape Sable in Monroe County and were placed on the endangered species list in 1967. Their designated critical habitat includes portions of Everglades National Park. The sparrows inhabit brushless, subtropical marshes that remain dry for most of the year. When seasonal floods inundate these areas, nesting behavior stops abruptly. Pairs generally nest 2 or 3 times each year (USFWS 1995).

Cape Sable seaside sparrows have declined primarily due to hydrologic and vegetation changes in their native range. The water control projects implemented throughout the Everglades, and intensive burning to promote agriculture, have disrupted their habitat.

Periodic flooding is necessary to maintain subtropical prairie grasses, and they are susceptible to fire and hurricane. Hurricane Andrew in 1992 killed many individuals of this species (USFWS 1995).

Sparrows are known to nest and forage adjacent to the existing freshwater well site, and in the shortgrass marsh habitat surrounding the road to Flamingo and the water transmission line corridor (Everglades National Park, pers. comm. Snow 2002).

The **Everglades snail kite** is a medium sized hawk that feeds almost exclusively on the *Pomacea* snail (apple snail), a large species occurring near the surface of Florida waters. The kite extracts the snail using its greatly curved beak. The kite inhabits open freshwater marshes, vegetated by sawgrass and spikerushes that support apple snails. The water level must be adequate to prevent drying out of the surface. This species was listed in 1967 and has designated critical habitat, including portions of Everglades National Park (USFWS 1991b).

The snail kite is threatened primarily from habitat destruction. Widespread drainage has lowered the water table, permitting drying. In addition, invasive plant species have grown in historically clear waters used by the kite for hunting by sight. These raptors are currently restricted to several locations in Florida. Recovery efforts include snail production management, protection of drought-related habitats, use of artificial nest structures, control of exotic vegetation, and limiting human disturbance. There is evidence that the population is responding, as counts have shown steady increases since the 1980s (USFWS 1991b).

The project area lies within the historical habitat of the snail kite. However, the species has not been present in this portion of the park for many years. There are no known nesting sites or recent recorded foraging near Flamingo. Concentrations of these raptors occur further to the north, near Shark Valley and other northern portions of the park. In the event that the species would return to the area, the habitat and conditions would be appropriate for their use (Everglades National Park, pers. comm. Snow 2002).

The **bald eagle**, with its white head and tail and dark body, is one of the most recognizable American birds. These large predators may reach 14 pounds, with a wingspan of 8 feet. Eagles feed largely on fish and tend to be found near the seacoast, and along the banks of rivers and lakes. Their lifespan is over 30 years in the wild. They mate for life, returning to the same nest yearly, and laying two to three eggs. Eagles from northern parts of the range migrate south for the winter, gathering in roosting areas (National Wildlife Federation 2002).

The status of the bald eagle was changed from endangered to threatened in 1995. Recovering from the effects of DDT, ingestion of lead shot, and illegal hunting, the species has made a dramatic comeback (National Wildlife Federation 2002).

The Flamingo area includes a variety of habitats utilized by bald eagles. North of the project area, eagles roost on both sides of the road at Mahogany Hammock. There is also a nest site in the mature pine trees near the roost. These resting and nesting locations are outside the immediate project area. Eagles have also have been observed foraging for fish in Florida Bay (Everglades National Park, pers. comm. Snow 2002).

The **Mangrove fox squirrel** is a subspecies of the fox squirrel, found only in southwest Florida. Fox squirrels are 10 to 12 inches in height, with tails 8 to 10 inches long. Most fox squirrels found in Florida are gray, black, and brown with white nose and ears. They may weigh up to 2 pounds. Their preferred habitat is mangrove stands, but they spend a great deal of time on the ground searching for nuts, buds, and seeds (Florida Fish & Wildlife Conservation Commission 2000).

Few details are known of the habits and specific preferences of this candidate species.

Mangrove fox squirrels had not been seen in the Flamingo area for many years until recent occurrences of road fatalities. Three incidents of mortality along the road to Flamingo have now been documented. No observations or reports of the live individuals in the wild have been recorded (Everglades National Park, pers. comm. Snow 2002).

The **Florida panther** is a large, pale brown or buff cat with white underparts and tail tip. Mature males weigh between 100 and 150 pounds and can reach 7 feet from nose to tip of tail. Females are considerably smaller – from 50 to 100 pounds and up to 6 feet in length. Panthers subsist on a mammalian prey consisting of white-tailed deer, wild hogs, and in some areas raccoon. Home ranges cover from 20 to over 450 square miles. Only preliminary data is available on Florida panther reproduction. Litter sizes range from 1 to 4 kittens, with a breeding cycle of 2 years (USFWS 1993a).

In general, panthers prefer large remote tracts with adequate prey, cover, and little disturbance. Habitat use is highly diverse and varies from upland hardwood hammocks, pinelands, and palm forests to wetland habitats of swamp and cypress. Cover is an important especially during hunting and denning. The panther historic range extended from eastern Texas through the southeastern states. But today it is unlikely that viable populations of the Florida panther presently occur outside Florida. The only known self-sustaining population occurs in South Florida, generally within the Big Cypress Swamp region. Currently, the wild population is estimated to be 30 to 50 adult animals (USFWS 1993a).

The recovery plan, prepared by the Florida Panther Recovery Team, seeks to achieve three viable, self-sustaining populations within the historic range of the panther. This is to be accomplished through three principal sub-objectives: identify, protect, and enhance existing panthers and protect habitats; establish positive public opinion support for panther management; and reintroduce panthers into suitable habitat.

Panthers are occasionally sighted in the Flamingo area. Their use of the area is not yet clear. There have been no reports of breeding pairs or denning activity in the area. They most likely pass through the area during hunting activities, and their presence would be considered transient (Everglades National Park, pers. comm. Snow 2002).

The **Florida manatee**, a federally-listed endangered species is a fully aquatic herbivorous mammal, a distinction shared only with other Sirenians. The manatee occupies a prominent position in the park's marine and estuarine systems as a prodigious grazer of submerged aquatic vegetation, spending about five hours a day feeding and in that time consuming about 4 to 9 percent of its body weight (20-45 kg/day) (Bengston 1983). Submerged aquatic vegetation, such as seagrasses, is a major component of the diet of manatees, and although manatees appear to tolerate marine and hypersaline conditions, they are most frequently found in fresh or brackish waters.

Therefore, the effect of changes in freshwater flow on salinity patterns, submerged vegetation and the overall quality of the foraging habitat in Florida Bay, and elsewhere in the park are, along with water temperature, important influences on the distribution and abundance of manatees in the area. Movements and aggregations of manatees can be correlated to some degree with the distribution of seagrasses and vascular freshwater aquatic vegetation (Hartman 1974). Manatees may or may not need freshwater to survive, but they frequently are reported drinking freshwater from natural sources as well as hoses, sewage outfalls and culverts in marine and estuarine areas. Little is known about the ability of manatees to osmoregulate and maintain water balance. Recent data suggest that manatees may require regular access to fresh, or perhaps brackish, water to meet water balance needs (Worthy 1998). Access to freshwater is probably more important to manatees than currently understood (Lefebvre, pers. comm. to Skip Snow 1998).

Increases in salinity are generally considered to result in less favorable conditions for manatees, although manatees move freely through a wide range of salinities. Adult manatees are seen on both sides of the Buttonwood Canal plug, year round, but most frequently on the Whitewater Bay side in winter months and on the Florida Bay side in Spring and Summer. As many as 10 to 15 manatees have been seen on the Whitewater Bay side at anyone time. Cows with dependent calves are occasionally seen on the Whitewater Bay side. If water quality conditions are altered (e.g. increasing salinity) there is the possibility that manatees may choose to avoid the area. The probability of this response is difficult to predict, as there are most likely other physical and environmental variables at play.

Stock Island tree snails are large buff-colored, conical snails, about 2 inches in length. The species is hermaphroditic and survives about 6 years. During the rainy season, the snails are active, and enter a dormant stage during the dry months of December through May. Nests containing about 8 to 20 eggs are built in September and hatch in June. These snails graze on fungi and algae that grow on both smooth and rough-barked trees of hardwood hammocks. The historical range includes natural hammocks of Stock Island and Key West within the Florida Keys, but the species has recently been found only in one hammock on Stock Island (USFWS 1992).

The snail has declined in population largely due to destruction of habitat. There is no direct competition with this species for food. Individuals are also lost to predation by cats and rodents. Recovery efforts have included collection of wild specimens for captive breeding. Additional sites in the Florida Keys are being investigated for reintroduction, and the Nature Conservancy has been contracted to enhance the current stock (USFWS 1992).

State Listed Species

The state of Florida lists a variety of plant and animal species as endangered, threatened, species of special concern, or commercially exploited. The Florida Game and Fish Commission list includes 117 animals; the Florida Department of Agriculture has identified 413 plant species for listing; and the federal listing for the state includes 54 plants and 104 animal species.

The project area is inhabited by the **osprey** (*Pandion haliaetus*), a Florida state species of concern. This large, long-winged raptor is brown above and white below with a white head and a dark eye stripe. The wing has a distinctive bend at the "wrist" and from a distance can resemble a gull. This species ranges from Alaska eastward to Newfoundland and south to Arizona and Florida. They winter along the Gulf Coast and in California. They inhabit lakes, rivers and seacoasts. They fish by hovering over the water and when prey is sighted they dive, talons first, into the water. The nest is a mass of sticks and debris placed in trees, on telephone poles, on rocks, or on the ground. Most broods include 2 to 4 chicks. Due to the use of pesticides, osprey populations declined dramatically in the 1950's and 1960's, but since then, the species has recovered significantly.

Three to four osprey nests have been identified near the proposed site of the new saltwater wells. This location is adjacent to the water treatment plant, within the Flamingo developed area. During construction of the new water treatment building, operations were temporary suspended to assure that noise from the drilling did not interfere with nesting activities.

The **White-crowned pigeon** (*Columba leucocephala*) is a state listed threatened species. In South Florida including greater Flamingo area it is common in summer and uncommon in winter. The birds feed in hardwoods, such as fig, pigeon plum,

poisonwood, and other fruit-bearing trees. Birds nesting on small keys in Florida Bay fly to the mainland (e.g. Flamingo area) or upper Keys (e.g. Key Largo) daily to feed. They are permanent residents in Florida, but their population numbers are highly seasonal. Pigeons begin returning to Florida in large numbers in April and the numbers increase until early June. Populations remain high through the summer with the seasonal peak occurring in September when many juvenile birds are flying. Most pigeons leave Florida between mid-September and mid-October. Most pigeons from Florida Bay and the upper Keys fly to the Bahamas. More than half of the Florida population nests in Florida Bay, in Everglades National Park. Nesting on mainland Florida is rare. Nesting requires mangrove covered islands that are free of raccoons and human disturbance. Pigeons require an abundant supply of fruit. The plants that produce this fruit are found in a number of habitats on the southern tip of the peninsula and in tropical hardwood forests on the Florida Keys. Fruiting hardwoods, such as those mentioned above, in the vicinity of the project area, provide potential feeding habitat for pigeons. These areas are found on natural high ground hardwood hammocks and artificial high ground such as road shoulders, berms, and fill areas. Alternatives that disturb or remove fruit-bearing hardwoods the least are most favorable to pigeons. Work conducted in the winter dry season months, would be least disturbing to pigeons.

Several state listed plant species may occur in the project area, but specific information on these species, or the likelihood of their occurrence is not available at this time. Prior to the implementation of the preferred alternative, a survey of the site would be conducted by a qualified, professional botanist (Everglades National Park, pers. comm. Armentano 2002). The plants contained on the state of Florida listing, with potential to occur in the project are presented below in Table 8.

Impacts to Endangered, Threatened or Protected Species and Critical Habitats of Alternative A: No Action/Continue Current Management

American crocodile. Continued use of the current water system would require periodic scheduled maintenance, as well as occasional emergency repairs along the transmission line corridor and with the distribution system network. During repairs, small-scale excavation would occur to provide access to the leaking section of the pipe. If such repairs occurred during nesting season, crocodiles could be drawn to the site. In the case of emergency repair, mitigation by timing of surface disturbance could not be accomplished. Mitigation to restrict crocodile access to any disturbance, such as fencing, would be implemented. There would be no long-term affects associated with this alternative. This would result in a may affect, but not likely to adversely affect finding for the American crocodile

Eastern indigo snake. Under the no action alternative, maintenance and repair would be necessary along the transmission line. Small-scale excavation would be required, and open pits would be present for the time necessary to make repairs. Overnight covers would be placed over any open pits, but there is the possibility that individual indigo snakes could become trapped. It is unlikely that fatality would result from temporary trapping, but these individuals would be affected. This would result in a may affect, not likely to adversely affect determination for the Eastern indigo snake.

Wood stork. Under the no action alternative the nesting colony adjacent to the main road to Flamingo could be affected by repair and maintenance efforts along the transmission line corridor. However, they have established this site in the presence of traffic that conveys 150,000 visitors to Flamingo each year. Actions for repair and maintenance would be short-term and occur within the road right-of-way. The colony would not be directly disturbed. If the noise or disturbance were

perceived by the storks to be in excess of traffic and normal human activities, they may avoid the site or reduce their time at the site for the brief period necessary to affect line repairs. There would be no long-term effects on the colony. This would result in a may affect, but not likely to adversely affect finding for the wood stork.

Everglades snail kite. Breeding kites have not been observed in the southern marshes of the park, including the greater Flamingo area, for many years. Although the habitat necessary to support the species is still present in the project area, the snail kite now breeds in the northern part of the park and the Water Conservation Areas to the north of Tamiami Trail (U.S. Highway 41). Non-breeding kites, however, are seen in the project area in winter foraging in suitable marshes such as Nine Mile Pond. Any actions taken in the Flamingo area would not affect the Everglades Snail Kite.

Cape Sable seaside sparrow. These birds are known to nest in areas surrounding the existing freshwater wellheads. The birds have adapted to levels of human activity necessary to maintain the wellheads and nearby electrical transmission station. Under current management, repairs on the main transmission line would require excavation, and the presence of equipment may cause sparrows to avoid the immediate area or reduce time spent in the area for the short-term duration of the action. This would result in a may affect, but not likely to adversely affect finding for the Cape Sable seaside sparrow.

Bald eagle. The bald eagle roost and nest sites in this portion of the park are located to the north of the existing well site near the Mahogany Hammock. This site is not in close proximity to the transmission line corridor that leads from the wellheads to Flamingo. Any actions taken to maintain or repair the line would not interfere with eagle activities in the area, and would have no effect on bald eagles.

TABLE 8: STATE LISTED PLANT SPECIES WITH POSSIBILITY TO OCCUR IN THE PROJECT AREA

COMMON NAME	SCIENTIFIC NAME	STATE OF FLORIDA STATUS
	**Caesalpinia bonduc*	
**Wild cinnamon	*Canella winterana*	
	**Celosia nitida*	
**Cowhorn orchid	*Cyrtopodium punctatum*	Endangered
	**Drypetes lateriflora*	
**Dollar orchid	*Encyclia boothiana*	
**Shell orchid	*E. cochleata*	
	**Erithalis fruticosa*	Threatened
**Wild cotton	*Gossypium hirsutum*	Endangered
**Machineel	*Hippomane mancinella*	Endangered
**Joewood	*Jacquinia keyensis*	Threatened
	**Maytenus phyllanthoides*	
	**Oncidiuim undulatum*	
	**Pavonia paludicola*	
**West Indian mahogany	*Swietenia mahagoni*	Endangered
**Common wild pine	*Tillandsia fasciculata var. densispica*	Endangered
**Giant wild pine, giant air plant	*T. utriculata*	Endangered
**Inflated wild pine	*T. balbisiana (T)*	Threatened
**Worm-vine orchid	*Vanilla barbellata*	Endangered

* Scientific name provided by T. Armentano, Everglades NP, common name could not be located on Florida state website

** Scientific name provided by T. Armentano, Everglades NP, common name located on Florida state website

Mangrove fox squirrel. Because the activities of the mangrove fox squirrel in the project area are largely unknown, it is not possible to determine a no effect outcome for any management activities.

However, because current management does not include disturbance in mangroves or hammocks likely to support the squirrel, it is unlikely that they would be affected. This would yield a may affect, but not likely to adversely affect finding for the mangrove fox squirrel.

Florida panther. Panther use of the project area is largely transient; most likely during hunting. Under the no action alternative, routine maintenance and repairs of the existing water system would be unlikely to affect any individuals of this species. In the event that an individual animal encountered repair activities along the transmission line corridor or within the distribution network, they would likely avoid the immediate area. Continuing current management may affect, but would not likely adversely affect the Florida panther.

Florida manatee. Manatee use of the project area is confined to the Buttonwood Canal, Flamingo Marina and Florida Bay. Under the no action alternative, routine maintenance and repairs of the existing water system would not affect any individuals of this species.

Stock Island tree snail. This species is unlikely to occur in the Flamingo area. If the species were found in the area, it would inhabit hardwood hammocks, which would not be affected by the no action alternative. There would be no effect to the Stock Island tree snail under the no action alternative.

State Species. Under the no action alternative, the existing wells, 16-miles northeast of Flamingo would continue to be utilized. This site is not a known roosting or nesting area for the osprey. Because osprey prey on fish, any disturbance associated with maintaining the existing system would not affect foraging. Ospreys would not be affected by implementation of the no action alternative.

It is not known if the state listed plant species occur within the project area. To avoid any disturbance to these species, a plant survey, performed by a qualified botanist, would be required prior to any actions requiring new disturbance of any previously disturbed areas. If identified, these species would be avoided and protected according to Florida regulations and requirements.

Cumulative Effects. The decline in populations of South Florida wildlife that has resulted in the designation of endangered and threatened species is due largely to habitat destruction. Large-scale water control projects installed to promote agriculture and development have resulted in disruption of the hydrologic cycle and destruction of native vegetation across the region. Within Everglades National Park, wildlife find refuge from development pressures and protection from hunting. The efforts of the park to protect species provides a benefit for their populations.

The park is planning to implement other projects within the Flamingo developed area. These plans include, but are not limited to, the Flamingo road realignment and installation of a new wastewater treatment system. Implementation of these plans would include disturbance associated with construction activities. Because these activities would be contained within the Flamingo developed area where threatened and endangered species pursue few activities, they would not be likely to produce significant effects on these species.

The limited amount of disturbance associated with management actions of the no action alternative would not likely contribute detectably to regional cumulative effects on South Florida's threatened and endangered species.

Conclusion. The effects to endangered and threatened species under the no action alternative range from "no effect" to "may

affect, not likely to adversely affect." The disturbance that could occur along the transmission line corridor would result from the need for repairs, and would not occur on a set schedule. Surface disturbance and excavation would be small scale and of duration sufficient only to complete repairs.

Alternative A would not produce major adverse impacts on threatened and endangered species or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of endangered, threatened, and or protected species or critical habitats as a result of the implementation of Alternative A.

Impacts to Endangered, Threatened or Protected Species and Critical Habitats of Alternative B: The Preferred Alternative

American crocodile. Under the preferred alternative, excavation and surface disturbance would occur only at staging sites for pipe bursting and at the site of new well drilling. These locations are within the previously filled, developed area, which could serve as potential crocodile nesting areas. Upgrading the distribution system and replacing the existing wells could affect crocodile nesting behavior. Excavation required to extend the brine discharge pipe 300-feet to the percolation pond would create surface disturbance adjacent to the wastewater treatment plant. Disturbance would be short-term and the site would be revegetated. Further disturbance of the site would not be likely. To avoid attracting nesting crocodiles, excavation within potential nesting sites would not be performed during crocodile nesting season. Installation of the new water treatment system may affect, but would not likely adversely affect, the American crocodile.

Eastern indigo snake. During installation of the new water system components, small areas of surface disturbance would be present for the time necessary to complete pipe bursting and saltwater well installation. These actions would take place in the developed area of Flamingo, not in or the habitat of the Eastern indigo snake. Actions undertaken to install the new water system at Flamingo would have no effect on the Eastern indigo snake.

Wood stork. Implementation of the preferred alternative would abandon the 16-mile water transmission line in place. The Paurotis Pond wood stork colony would no longer be subjected to the occasional, random disturbance caused by periodic repair and maintenance of the water transmission line. This would have a beneficial effect on the colony because there would be little potential for disturbance above normal visitor traffic and road activities. The preferred alternative would produce a may affect, not likely to adversely affect finding for the wood stork.

Everglades snail kite. Breeding kites have not been observed in the southern marshes of the park, including the greater Flamingo area, for many years. The snail kite now breeds in the northern part of the park and the Water Conservation Areas to the north of Tamiami Trail (U.S. Highway 41). Non-breeding kites, however, are seen in the project area in winter foraging in suitable marshes such as Nine Mile Pond. Suitable habitat for the kite is still present near the project area, and no actions undertaken to implement the preferred alternative would diminish this. There would be no effect on the snail kite under implementation of the preferred alternative.

Cape Sable seaside sparrow. The sparrows that inhabit the area adjacent to the existing freshwater wells could experience a brief period of disturbance while workers purge the transmission line and cap the wellheads. These actions would not require excavation or the presence of heavy equipment. The activities would last no more than 2 or 3 days. Workers would be instructed to limit their presence to the area necessary to perform the action. This

would result in a may affect, but not likely to adversely affect finding for the Cape Sable seaside sparrow.

Bald eagle. The bald eagle roost and nest sites are north of the existing well site near the Mahogany Hammock. Actions taken to abandon the transmission line would occur at the wellheads, and would have little potential to disturb eagle activities. This would result in no effect on bald eagles.

Mangrove fox squirrel. Actions undertaken to complete the new water system would not affect hardwood hammocks. During purging of the new saltwater wells, the mangrove stand adjacent to the water treatment plant would receive 2,000 gallons of salt water. This is unlikely to affect the mangroves or wildlife that inhabit the stand. The road to Flamingo, where fatalities have occurred, would continue to be used by 150,000 park visitors each year. The minute reduction in road use by elimination of maintenance and repair activities at the existing well site and along the transmission line would be unlikely to affect the species. This would yield a may affect, but not likely to adversely affect finding for this species.

Florida panther. Construction activities associated with installation of the new water system would occur within the Flamingo developed area. Noise would be generated at the drilling site for the new wells, at staging areas for pipe bursting, and during excavation to install 300-feet of brine discharge piping to the percolation pond. This disturbance would be temporary, and all areas would be reclaimed. Individual panthers that may pass through the area during these activities would likely avoid the disturbance. Implementation of the preferred alternative may affect, but would not likely adversely affect, the Florida panther.

Florida manatee. Implementation of the preferred alternative would likely affect the salinity of Buttonwood Canal in the immediate vicinity of its intersection with the brine discharge plume infiltrating from the percolation pond. Changes in salinity may possibly result in a behavioral response by manatees that could possibly include avoidance of high salinity water. However, this is in no way certain or predictable. The influence of the brine plume on the canal would occur over the life of the project. However, the intensity of the effects would probably vary from season to season, appearing greatest in the dry season (November–April) and least in the wet season (May–October). While an effect on salinity and a possible behavioral response by manatees would be expected, the effect would likely be localized and minor due to a number of mitigating factors. These factors include: 1) a low volume of brine produced, 180,000 gallons per day; 2) a high mixing rate in the canal, especially in winter, due to boat traffic and to a lesser extent tides; 3) the canal serves as a sink for rain water and runoff from adjacent areas aiding mixing and dilution in the wet season and during dry season rain events; and 4) a high tolerance by manatees for a wide range of salinities. Therefore, installation of the new water treatment system may affect, but would not likely adversely affect, individual members of this species.

Stock Island tree snail. This species has not been reported in the Flamingo area. If the species were found in the area, it would inhabit hardwood hammocks, which would not be affected by the preferred alternative. There would be no effect to the Stock Island tree snail under this alternative.

State Species: The new saltwater well site lies in the vicinity of known osprey nesting sites. Under this alternative, drilling of the well would be timed to avoid critical nesting and fledging activities. Using appropriate planning and scheduling of drilling activities, effects to this species can be minimized.

The status of state listed plant species within the project area is not currently known. To avoid any disturbance to these species, a plant survey, performed by a qualified botanist, would be required prior to any actions necessitating disturbance. If identified, these

species would be avoided and protected according to Florida regulations and requirements.

Cumulative Effects. South Florida's wildlife is threatened primarily from habitat destruction. Disruption of the hydrologic cycle and changes in vegetative communities are widespread in the region. Everglades National Park, in concert with other federal and state protected areas, provides protection for these species.

Other plans for activities in the Flamingo area include road realignment and installation of a new wastewater treatment system. Because the construction associated with these projects would be confined to the previously disturbed and developed areas of Flamingo, threatened and endangered species would not be likely to experience significant effects as a result of these projects.

The limited disturbance necessary to complete the new water, in concert with other planned management activities in Flamingo, would not be likely to make a detectable contribution to effects on endangered and threatened species in South Florida.

Conclusion. The effects to endangered, threatened, and protected species under the preferred alternative range from "no effect" to "may affect, not likely to adversely affect." Additionally, there would be no adverse effects to the designated critical habitats of any of these species. Abandonment of the 16-mile water transmission line would benefit species that inhabit the corridor because disturbance associated with maintenance and repair would be eliminated. Replacing portions of the distribution system, as needed, and installation of 300-feet of brine discharge piping to the percolation pond would require short-term disturbance that would produce little effect on these species or their habitats.

Alternative B would not produce major adverse impacts on endangered, threatened, or protected species or critical habitats whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of endangered, threatened, or protected species or critical habitats as a result of the implementation of Alternative B.

AQUATIC LIFE

Affected Environment

The area of analysis for aquatic life consists of both freshwater and marine habitats and the populations and communities associated with them. Below are descriptions of both habitat types and their associated communities as they occur within the project area.

Freshwater. The freshwater environment consists primarily of West Lake, and shallow pools associated with the freshwater marl prairie surrounding the current well site and adjacent to the existing transmission line. These water bodies support dense communities of fish, as well as a variety of amphibian and reptile species. Some of the more common species observed within this region are listed in table 9.

Marine. The brackish interface between fresh and salt water provides a rich environment, high in biodiversity. The region of potential impact within this marine/brackish environment is composed of saltwater marshes, and small portions of Florida Bay and Buttonwood Canal. Over 100 species of fish, and a variety of invertebrate species have been identified in Florida Bay. American crocodiles and manatees , though rare, are occasionally found in the bay as well as the canal. Common marine species observed within the region are included in Table 10.

TABLE 9: FRESHWATER WILDLIFE WITHIN THE AREA OF ANALYSIS

Common Name	*Scientific Name*
Amphibians	
Everglades dwarf siren	*Psendobranchus striatus*
Peninsula newt	*Notophthalmus viridescens*
Reptiles	
Brown water snake	*Nerodia taxispilota*
Florida water snake	*Nerodia fasciata*
South Florida swamp snake	*Seminatrix pygaea*
American alligator	*Alligator mississippiensis*
Striped mud turtle	*Kinosternon baurii*
Diamondback terrapin	*Malaclemys terrapin*
Florida softshell	*Apalone ferox*
Fish**	
Largemouth bass	*Micropterus salmoides*
Bluegill	*Lepomis macrochirus*
Florida gar	*Lepisosteus platyrhincus*
Mosquitofish	*Gambusia holbrooki*

Source: http://www.nps.gov/ever/eco/lists.htm

TABLE 10: MARINE WILDLIFE WITHIN THE AREA OF ANALYSIS

Common Name	*Scientific Name*
Reptiles	
American crocodile	*Crocodylus acutus*
Mangrove salt marsh snake	*Nerodia clarkii*
Fish	
Snook	*Centropomus Undecimalis*
Red Drum	*Sciaenops ocellatus*
Spotted Seatrout	*Cynoscion nebulosus*
Gray Snapper	*Lutjanus griseus*
Tarpon	*Megalops atlanticus*
Black Drum	*Pogonias cromis*
Sheepshead	*Archosargus probatocephalus*
Spanish Mackerel	*Scomberomorus commerson*
Lady Fish	*Elops saurus*
Crevalle Jack	*Caranx hippos*

Source: http://www.nps.gov/ever/eco/lists.htm

Impacts to Aquatic Life of Alternative A: No Action/Continue Current Management

Freshwater. Direct, short and long-term, negligible to minor effects to aquatic life, brought about by chemically treated water leaking from the transmission line into surrounding wetlands, currently exist and would continue under the no action alternative. About 60,000 gallons of water containing chloramines, phosphate, and Aquamag ® (a pipe corrosion inhibitor) leak from various points along the 16-mile transmission line into adjacent wetlands everyday. This water is immediately diluted by surface water and, when taken in the context of the entire 16-miles of pipe, is not concentrated in any one area. The vegetation within these wetlands are phosphorus limited, so the addition of phosphorus from the leaking water does effect them by altering the naturally occurring nutrient levels. The chloramines and Aquamag ® present in the leakage water are fairly benign, and would not produce appreciable impacts to the aquatic life in these wetlands.

The West Lake comfort station currently uses approximately 100 gallons of water per day (during the high visitation season) for toilet flushing. Once flushed this water enters a septic system, and eventually reenters the ground and surface waters. This water does not currently, nor would it in the future, have an appreciable effect on freshwater aquatic life. Direct, long-term, negligible effects caused by a limited nutrient addition to West Lake would be associated with the no action alternative.

Marine. Water leaking from the existing distribution system (approximately 10,000 gallons of treated water per day) migrates into Florida Bay. This water contains low concentrations of phosphate which is added during treatment, and below ambient levels of nitrates. As this water leaks out of the distribution lines the phosphates readily bind to the soil it comes in contact with. The no

action alternative would not contribute to the elevated nutrient levels existing in Florida Bay and any (short or long-term) adverse effects occurring from the continued use of the distribution system on marine aquatic life would be negligible.

Cumulative Effects. Nutrient loading from various sources within Flamingo developed area and agricultural sources north of the park are widely assumed to contribute to elevated nutrient levels in Florida Bay. Algal blooms, sea grass die off, and changes in the historical community makeup (both plant and animal) have occurred in the bay (all indications of nutrient loading). However, during a workshop held by the Florida Bay Program Management Committee, a multi-agency organization which coordinates research efforts for Florida Bay, the panel found no unnatural source of nutrients coming from the mainland and saw no indication that current management strategies were adding nutrients to Florida Bay (NPS 1996, http://www.nps.gov/ever/current/fbn96-1.htm).

No cumulative effects to aquatic life would result from the implementation of the no action alternative.

Conclusion. Short and long-term, adverse impacts to freshwater and marine aquatic life resulting from the implementation of the no action alternative would range from negligible to minor, and would result from the continued draw down of groundwater in the area of the existing freshwater wells, and the continued leaking of chemically treated water from the transmission line.

Alternative A would not produce major adverse effects on aquatic life whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of aquatic life as a result of the implementation of Alternative A.

Impacts to Aquatic Life of Alternative B: The Preferred Alternative

Freshwater. Impacts attributed to chemically treated water leaking from the existing 16-mile transmission line, noted in the no action alternative, would no longer occur, and the area surrounding the transmission line would return to pre-water line conditions. No noticeable changes would be likely, but this would be considered a long-term, negligible, beneficial effect to aquatic life.

Under the preferred alternative, water would no longer be drawn from the transmission line to supply West Lake comfort station. Instead, surface water from West Lake would be utilized for this activity. Approximately 100 gallons per day (during times of high visitation, approximately six months of the year) would be drawn from the lake via 4 inch collection pipe, used for flushing, and entered into the existing septic system. The collection pipe would be boxed/screened and placed away from the shore. Both of these measures would be aimed at reducing impacts to young American crocodiles and other aquatic life. Resultant impacts to aquatic life in West Lake would be negligible, long-term, and adverse.

Marine. As a consequence of the preferred alternative, a steady 300,000 gallons of saltwater per day would be drawn within the vicinity of the existing water treatment plant. A shallow cone of depression may result from this activity, which could in turn have an adverse effect on aquatic life in the surrounding area. However, water being drawn by these wells would be supplied by seawater infiltration rather than from a limited aquifer, so recharge of the groundwater would be nearly instantaneous. Resultant effects to aquatic life, if any occurred, would be long-term, negligible and adverse.

Installation of the new saltwater wells would include a purging of the new pump system. During this activity, approximately 2,000 gallons of raw saltwater would be drawn through the system and discharged into a nearby mangrove stand. Discharge of this quantity of saltwater into the mangrove stand would produce direct, short-term, negligible to minor, adverse effects on aquatic life that would be highly localized.

The proposed reverse-osmosis treatment system would produce approximately 180,000 gallons of concentrated saltwater (approximately 60,000 parts per million total dissolved solids) every day. This "brine concentrate" would be transported from the water treatment plant to the percolation pond, located near the wastewater treatment plant, via an existing 4-inch pipe. The percolation pond is unlined and would allow for the infiltration of the concentrate into the surrounding area. Samples taken from monitoring wells in this area show existing water to be saline (approximately 40,000 parts per million total dissolved solids). The addition of 180,000 gallons of brine concentrate per day would have only minor, long-term, local (5-10 acres), adverse effects might include a slight change in water quality in Buttonwood Canal and an adjustment towards a more salt tolerant community.

Cumulative Effects. No cumulative effects to aquatic life would result from the implementation of the preferred alternative.

Conclusion. Short and long-term, adverse impacts to aquatic life resulting from the implementation of the preferred alternative would range from negligible to minor, and would result from the release of 2,000 gallons of purged saltwater into mangroves, a drawdown of saltwater in the vicinity of the water treatment plant; and a change in community composition in the area surrounding the percolation pond and between percolation pond and Buttonwood Canal. A long-term, negligible to minor, beneficial effect to aquatic life would result from the cessation of chemically treated water leaking into the wetlands surrounding the transmission line.

Alternative B would not produce major adverse impacts on aquatic life whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of aquatic life as a result of the implementation of Alternative B.

VEGETATION

Affected Environment

The majority of the area of analysis is highly disturbed and contains artificially maintained vegetation. Lawn covers much of the proposed action site including the area surrounding the water treatment plant, a few feet to either side of the main park road (where the transmission line runs), the area surrounding the percolation pond and throughout the campgrounds and concessionaire's development (where the distribution system runs).

The general region encompassing the developed area described above is coastal prairie interspersed with mangrove stands, coastal hammocks, and coastal saltwater marshes. The region supports thickets of Brazilian pepper (*Schinus terebinthifolius*) and lather leaf (*Colubrina asiatica*), both of which are exotic species, as well as a number of native vines, herbs, and small shrubs that occur along the edges and in the understory of these thickets.

Coastal Prairie

Located within the mangrove zone inland of Florida Bay and the Gulf of Mexico, coastal prairie is a habitat characterized by salt-tolerant herbaceous vegetation subject to salt-

water inundation associated with strong tropical storms and saltwater intrusion in droughts. It is characterized by succulents and other low-growing plants that can withstand the harsh conditions. Refer to the park's website for more information about the vegetation and habitat (http://www.nps.gov/ever/eco/habitats.htm).

Mangroves
Mangrove forests are found in coastal areas subject to regular or sometimes only occasional tidal flushing which produces elevated soil salinity. Each mangrove species has a different level of salt tolerance, which in part determines its location in tidal zones. Mangroves grow best where freshwater runoff contributes nutrients and helps maintain optimum salinity levels. Mangrove forests provide foraging and nesting sites for wading birds and nursery habitat for pink shrimp and numerous other fish. Refer to the park's website for more information about the vegetation and habitat (http://www.nps.gov/ever/eco/habitats.htm).

Freshwater Marl Prairie
A freshwater marl prairie is a type of marsh that is flooded by freshwater about 3 to 7 months a year. The prairies occur on a calcitic marl that varies in depth and is produced by the action of periphyton that shares dominance of the prairies with many species of grasses and sedges such as saw grass. Refer to the park's website for more information about the vegetation and habitat (http://www.nps.gov/ever/eco/habitats.htm).

Surface and ground water is being drawn down in a shallow cone of depression surrounding the existing freshwater wells. There is no observable border to the cone of depression, and no observable change in vegetation caused by it.

Impacts to Vegetation of Alternative A: No Action/Continue Current Management

As stated in the affected environment, a shallow cone of depression caused by drawdown of the two existing freshwater wells exists. The existing wells pump 160,000 gallons per day of the permitted 212,000 gallons per day. Pre-well/pre-drawdown baseline conditions do not exist for this area, but there is not a noticeable border or change in vegetation associated with the cone of depression. Long-term impacts to the vegetation surrounding the wells are, and would continue to be, negligibly adverse because measurable changes in plant community size, integrity or continuity would not occur.

The transmission line running from the wells to the water treatment plant, along with the pipes in the distribution system, currently require emergency repairs approximately twice a year. These pipes run through wetlands, but are primarily within areas that have been previously disturbed. Repairs to these systems and related disturbances would cause short and long-term, minor adverse impacts to vegetation because in most cases only individual plants or very localized populations would be affected by the action, and mortality would be minimal in either instance.

Direct, short and long-term, negligible to minor adverse effects to vegetation, brought about by chemically treated water leaking from the transmission line into surrounding wetlands, do currently exist and would continue to occur under the no action alternative. About 60,000 gallons of water containing chloramines, phosphate, and Aquamag ® (a pipe corrosion inhibitor) leak from various points along the 16-mile transmission line into adjacent wetlands daily. This water is diluted by surface water in the wet season and released into the surrounding marsh in small amounts along the entire 16 miles of pipe, and is not concentrated in any one area. Because Everglades marshes are

usually phosphorus-limited, the added phosphate in the leakage water may cause some increased plant growth in the vicinity of the pipe. The chloramines and Aquamag ® present in the leaking water do not and would not produce appreciable effects to the vegetation in these wetlands.

The West Lake comfort station currently uses approximately 100 gallons of water per day (during the high visitation season) from the existing transmission line for toilet flushing. Once flushed, this water enters a septic system, and eventually reenters the ground and surface waters. This water does not currently, nor would it in the future, have an appreciable effect on vegetation. Direct, long-term, negligible effects to vegetation would be associated with the no action alternative.

Cumulative Effects. Repair of the existing wells, and transmission and distribution lines coupled with ongoing park activities, the proposed Flamingo wastewater treatment plant upgrades and the proposed road realignment project would result in minimal disturbance to vegetation within the project area. These disturbances would include localized trampling and vegetation removal surrounding repair and installation sites. Resultant effects to vegetation would be minor, short- and long-term, and adverse. While these effects would be perceptible they would be highly localized to the area immediately surrounding any activity and the viability of the plant community would not be affected.

Conclusion. Short and long-term, negligible to minor adverse effects to vegetation would result from the continued draw down of groundwater in the area of the existing freshwater wells, the continued need for repairs on both the transmission and distribution system pipes, and the continued leaking of chemically treated water from the transmission line.

Alternative A would not produce major adverse impacts on vegetation whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of vegetation as a result of the implementation of Alternative A.

Impacts to Vegetation of Alternative B : The Preferred Alternative

The preferred alternative would alleviate the need for operation of the existing freshwater wells, and the 16-mile transmission line. Drawdown from the wells would cease, the associated cone of depression would dissipate, and leakage from the transmission line would no longer occur. Also, repair and maintenance of both the wells and the transmission line would no longer be needed. This would result in direct, long-term, minor beneficial effects to vegetation when compared to the no action alternative.

As a consequence of the preferred alternative, a steady 300,000 gallons of saltwater per day would be drawn from a depth of 50 to 150 feet within the vicinity of the existing water treatment plant. A shallow cone of depression may result from this activity, which could in turn have an adverse effect on vegetation in the area. However, water being drawn by these wells would be supplied by seawater infiltration, and not a limited aquifer. As a result, adverse effects to vegetation, would be long-term and negligible. Any changes in plant community would not be measurable or observable.

Installation of the new saltwater wells would include a purging of the new pump system. During this activity, approximately 2,000 gallons of raw saltwater would be drawn through the system and discharged into a nearby mangrove stand adjacent to the existing water treatment plant. Discharge of this quantity of saltwater into the mangrove stand would produce direct, short-term,

negligible to minor, adverse effects that would be highly localized. Mangrove trees are fairly salt tolerant and it is unlikely that they would be effected by this activity. Individuals of other less tolerant species found in the area may be damaged or killed, but these casualties would not alter the viability of the plant community and re-colonization would occur rapidly.

Under the preferred alternative water would no longer be drawn from the transmission line to supply West Lake comfort station, instead, surface water from West Lake would be used for this activity. Approximately 100 gallons per day (during 6 months of the year) would be drawn from the lake, used, and discharged into the existing septic system. To put this in perspective, West Lake has over 3 square miles of surface area, and the removal of 100 gallons would not be detectable. The preferred alternative would result in negligible, long-term, adverse effects to vegetation in and around West Lake.

The proposed reverse osmosis treatment system would produce approximately 180,000 gallons of concentrated saltwater (approximately 60,000 parts per million total dissolved solids) every day. This "brine concentrate" would be transported from the water treatment plant to the percolation pond, located near the wastewater treatment plant, via a 4-inch pipe. Before use, this pipe would need to be extended by 300 feet to reach the percolation pond. The installation of the new piping would occur entirely on previously disturbed fill, and would not cause any effects to native vegetation.

The pond is unlined and would allow for the migration of the concentrate into the surrounding area. Samples taken from monitoring wells in the area show existing water to be saline (approximately 40 parts per thousand total dissolved solids). The addition of 180,000 gallons per day of concentrate averaging 60 parts per thousand would have minor, long-term, local adverse effects on vegetation in the vicinity. However some changes in the vegetation of the affected area are expected. For example, mangrove trees presently growing within the affected area would respond to the increased pore water salinity by leaf loss and crown die-back as has been seen on some islands in Florida Bay. Most of these trees are expected to survive but with smaller, thinner crowns. Mortality of some trees is possible if salinities rise in the dry season when evaporation can far exceed precipitation. Some of the more salt-tolerant of the halophytic prairie species would be put at competitive advantage by the elevated salinities and expand their distribution in the affected area. Overall, the impacts in the affected area are regarded as acceptable based on: 1) the small size of the affected area, 2) the fact that native salt-adapted plant communities are known to tolerate the expected salinities and therefore are likely to persist in the affected area and, 3) that the composition and structure of the community is likely to resemble natural communities found on the north shore of Florida Bay and on many islands in Florida Bay, where elevated pore water salinities produce characteristic mangrove and halophytic communities.

Cumulative Effects. Other activities within the area of potential impact would occur coincident to the implementation of the preferred alternative. These activities would include, but not be limited to, the proposed Flamingo wastewater treatment plant upgrade and the proposed road realignment. These activities along with those associated with the preferred alternative would produce disturbances (i.e. trampling of vegetation, and removal of plant in and around repair/installation sites), and result in negligible to minor, long-term, adverse cumulative effects to vegetation.

Conclusion. Short and long-term, adverse impacts to vegetation resulting from the implementation of the preferred alternative would range from negligible to minor, and would result from the release of 2,000 gallons of purged saltwater into mangroves, a drawdown of saltwater in the vicinity of the water treatment plant, and a change in

community composition in the area surrounding the percolation pond. A long-term, negligible to minor, beneficial effect to vegetation would result from the cessation of chemically treated water leaking into the wetlands surrounding the transmission line.

Alternative B would not produce major adverse effects on vegetation whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of vegetation as a result of the implementation of Alternative B.

CULTURAL RESOURCES

Affected Environment

Prehistoric Resources. Human occupation of southern Florida may date back as far as 4,000 years. The presence of black earth middens, shell mounds, evidence of transient camps, and features containing stone tools and implements indicate that humans have used this area for many centuries. Black earth "middens" are mounds of soil and shells that now support lush hammock growth. These formations are common across marshy South Florida. Artifacts found in these locations include ceramics, bone tools and ornaments, and food debris (shell and bone) that reflect the diet of these early inhabitants. Modern exploration and documentation of prehistoric resources indicate that the area was continuously occupied by humans during the Glades period, approximately A.D. 400 to 1400. In many instances, these archeological sites have been farmed, used as historic hunting camps, and been sites of artifact collection, looting and vandalism (NPS 2001b).

The Everglades were most likely the year-round home of early transient hunter-gatherer groups. These people relied on wild foods and shellfish for sustenance, and ranged across the area to find food sources. Little evidence of permanent settlements has been located.

Two prehistoric sites have been recorded near the Flamingo/Cape Sable area. The closest, the Bear Lake Mounds, are located approximately 3 miles north of the project area near the Homestead Canal. The second, the Coot Bay Middens, lie between Coot Bay and Mud Lake, approximately 4 miles to the northeast of Flamingo (Taylor, NPS 1985).

Ethnographic Resources. When Europeans began arriving in South Florida around A.D. 1500, they found a thriving population of about 20,000 Native Americans. There were five tribes, two of which – the Tequesta and Calusa – inhabited the area that is now Everglades National Park. When the English gained control of Florida in 1793, only a few hundred members of these tribes remained. These remaining Native Americans reportedly migrated to Cuba with the Spanish (U.S. National Parks Net 2002).

Two Native American Tribes presently reside in South Florida. The Seminole and Miccosukee are descendants of Creek Indians who immigrated to the area during the A.D. 1600s to 1800s. These groups resisted relocation to the reservations of Oklahoma and retreated into the far reaches of what is today Everglades National Park and Big Cypress National Preserve (NPS 2001b).

The Seminole Tribe incorporated in 1957, and the Miccosukee incorporated in 1962. Many members of the Seminole Tribe now occupy the Big Cypress Seminole Reservation. There are members of both groups that remain unaffiliated and politically independent. The Trail Miccosukee, or Traditional Miccosukee, occasionally establish roadside villages and provide concession services to park visitors. The Miccosukee Tribe of Indians have also constructed a hotel and gaming resort along

Tamiami Trail 20 miles east of the Shark Valley entrance to the park.

Historic Resources. Between A.D. 1500 to 1750, Europeans arrived in the area. Early mariners recorded the locations of Cape Sable, located just west of Flamingo. Several attempts were made to settle the area in the 1800s, but environmental conditions and conflict with Native Americans prevented the success of early white settlement (U.S. National Parks Net 2002).

The U.S. Government transferred much of the land in South Florida to state control in 1850. Over the next 50 years, non-Indian settlers arrived by boat to the area that is now the western portion of Everglades National Park. Settlement remained near the bay until construction of the Tamiami Trail in 1928 brought settlers inland (NPS 2001b).

Flamingo was established in 1898, when about 50 families gathered into a community and engaged in fishing, hunting and farming. Residents hoped the railroad line to Key West would pass through their small town. When this did not happen, the community declined. In 1919, there were about half a dozen structures in Flamingo, including a school and three houses. In 1921, a road to the town of Homestead was opened, but this did not foster economic growth (Paige 1986). Road access did not solve the problems of limited water supply and hordes of insects.

All of the early buildings constructed at Flamingo have been destroyed over the decades by hurricanes. The area was struck by storms in 1909, 1910, 1926, and again in 1935, with each storm delivering considerable damage. Hurricane Donna damaged or destroyed the remaining buildings at Flamingo in 1960 (Paige 1986).

Approximately 20 miles east of Flamingo, is the proposed Ingraham Highway Historic District. In 1916, Royal Palm State Park was established and a road was barely completed from Homestead to the state park in time for the dedication. This highway, eventually named the Ingraham Highway, was the first to cross the Everglades. The roadway, and three of its associated drainage canals, are now proposed for nomination to the National Register of Historic Places (NPS 2000b). This location is now part of Everglades National Park and these historic structures can be seen at the Royal Palm Visitor Center.

Cultural Landscape. No cultural landscape has been designated for Flamingo; thus there is no cultural landscape report available for the project area. The modern Flamingo includes a marina, visitor center and museum, motel accommodations, and park housing. All structures were built since the park was established in 1947. The fill underlying the existing facilities was placed over several decades and varies in composition and depth. Most buildings are of concrete and cinder block, built for function and to withstand environmental conditions. However, the buildings, lawns, and palm trees, set against the backdrop of the lush and exotic Everglades environment, convey a special sense of place to the visitor.

Previous Investigations

Everglades National Park, including the Flamingo area, has been surveyed for archeological sites. Taylor (NPS, 1985) lists two prehistoric middens several miles from the project area. This report also includes the finding of cultural material on two outlying Florida Bay keys. Both of these sites are outside the area of potential effect.

Impacts to Cultural Resources of Alternative A: No Action/Continue Current Management

Any repair or maintenance activities associated with current management would occur in previously disturbed areas, most of which have been excavated and filled to accommodate construction of existing park facilities. Because there is no soil disturbance, excavation, or construction, in previously undisturbed areas, continuation of existing

conditions would not be likely to have any impact on prehistoric, historic, ethnographic, or cultural resources.

Cumulative Impacts. Because there is no disturbance in previously undisturbed areas associated with ongoing management, implementation of the no action alternative would not contribute either beneficially or adversely to cumulative impacts on cultural resources at Flamingo or in Everglades National Park. Effects to parkwide or regional resources caused by vandalism, theft or looting would not be mitigated under this alternative.

Conclusion. Because there is no excavation in previously undisturbed areas, there is little potential for this alternative to expose unknown sites. In addition, no known cultural resources are present in the project area. There would be no effects to cultural resources as a result of implementation of the no action alternative.

Alternative A would not produce major adverse impacts on cultural resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other NPS planning documents. Consequently, there would be no impairment of cultural resources or values as a result of the implementation of Alternative A.

Impacts to Cultural Resources of Alternative B: The Preferred Alternative

Implementation of the preferred alternative would have no impact on known prehistoric or historic resources. Known sites in the area are outside the potential project area, and would not be affected.

The location of these facilities, on previously filled sites on the coastal plain, was not known to be utilized or inhabited by prehistoric residents of the regions in a manner that would concentrate cultural material, such as is found in hardwood hammocks or shell mounds.

Cumulative Impacts. Because there is no disturbance in previously undisturbed areas associated with the preferred alternative, this alternative would not contribute either beneficially or adversely to cumulative impacts on cultural resources. Park plans to realign the Flamingo roadway and install a new wastewater treatment system would also occur on previously disturbed sites. The combination of these park actions is unlikely to result in detectable effects on the historic resources of Everglades National Park.

Conclusion. Because all disturbance associated with the preferred alternative occurs on fill and in previously disturbed areas, it is unlikely that there would be detectable effects on cultural resources as a result of implementation of this alternative.

Alternative B would not produce major adverse impacts on cultural resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of cultural resources or values as a result of the implementation of Alternative B.

SECTION 106 SUMMARY

A variety of researchers have visited the Flamingo/Cape Sable area to locate and document the historic resources of the area (Taylor 1985; Paige 1986; Tebeau, 1968). Two prehistoric midden sites are located several miles north of the project area. These are the Bear Lake Mounds and Coot Bay Middens. These prehistoric sites were visited and documented as early as 1924. Excavation at the mounds has yielded potsherds, fiber sources, animal bones, and shell fragments.

These sites were ground-truthed by the Southeast Archeological Center during February and March of 1984. Their visit revealed that vandalism had occurred in the form of excavation of several small pits (Taylor 1985).

Taylor also reports the occurrence of historic resources in the form of olive jar sherds, pottery, and copper Curry Key and Bradley Key, in Florida Bay. These were most likely left by early Spanish explorers. These sites are outside the area of potential impact. The keys were visited by representatives from the Southeast Archeological Center in March of 1984. No additional artifacts were seen and no *in situ* deposits were observed (Taylor 1985).

No traditional cultural properties have been identified within the project area, but consultation with concerned tribes is continuing ("Consultation and Coordination" section of this document). Consultation with tribes and with the Florida State Historic Preservation Office has been initiated (correspondence in Appendix A). A copy of this environmental assessment will be forwarded to tribes and the Florida State Historic Preservation Office for review and comment.

This environmental assessment provides detailed descriptions of two alternatives (including a no-action alternative), analyzes the potential impacts associated with possible implementation of each alternative, and describes the rationale for choosing the preferred alternative. Also contained in the environmental assessment are mitigation measures that would help avoid adverse impacts on cultural resources (Table 4).

The area of the proposed new Flamingo water treatment plant has been disturbed by man and nature. Prior to park establishment, the small village of fishermen, farmers and hunters was repeatedly damaged by hurricanes. Paige reports that in 1960, Hurricane Donna destroyed the last of the existing village structures at the site. In addition, the Flamingo developed area has previously been excavated and filled to allow for construction of facilities and infrastructure. Pursuant to 36 CFR 800.4(d)(1), implementing regulations of the National Historic Preservation Act (revised regulations effective January 2001), the National Park Service has determined that there are no historic resources present in the project area of the new Flamingo water treatment plant.

Because of the previously disturbed and filled nature of the sites, there is little probability for historic properties to occur in the project area. Therefore, the National Park Service has determined that there is no need for a comprehensive survey prior to project implementation. However, because the age, depth, and composition of the fill materials at specific sites are not known, cultural resource monitoring would be implemented during excavation activities. In compliance with 36 CFR 800.13, a qualified archeologist would be present on site to monitor excavation. In the event that historic resources are encountered, project work would be halted and the discovery process would be initiated.

VISITOR USE AND EXPERIENCE

Affected Environment

From 1998 to 2001, park-wide visitation has consistently been about one million recreational visits. Visitation to the Flamingo developed area is estimated at 150,000 visitors a year. Both boat ramp use and backcountry use increased by approximately 20 percent from 2000 to 2001, from 15,206 to 20,659 and from 7,954 to 9,954, respectively. Reported overnight stays at the lodge and tent camping was approximately the same for 2000 and 2001 with 40,000 and 12,416 overnights each year, respectively. Recreational vehicle overnights were down by 12 percent from 2000-2001 from 16,273 to 14,362.

Flamingo developed area is comprised of a small visitor center, lodge, restaurant, gift shop, guest cottages, and a 278-unit

campground. Boat tours and canoe rentals are available at the marina, providing access to Florida Bay and the wilderness waterway.

When potable water outages occur in Flamingo visitors are required to boil water for 2 days prior to completion of water system repairs. The frequency of the park having to issue "boil water" orders is as follows:

- 1998-6 "boil water" orders
- 1999-5 "boil water" orders
- 2000-11 "boil water" orders
- 2001-5 "boil water" orders
- 2002-1"boil water" order to date

Impacts to Visitor Use and Experience of Alternative A: No Action/Continue Current Management

If the no action alternative were to be implemented, the continued deterioration of the existing water treatment system (frequent repair of transmission and distribution lines along with electrical and chloramine injection system repairs at the well) would potentially increase the frequency and duration of potable water outages for the park. The impact of these frequent potable water outages would have a direct, short and long-term, moderate adverse effect on day-users, overnighters, lodge guests, cottage guests, boaters, and campers in the Flamingo area because of:

- Visitors having to purchase bottled drinking water,
- An increased number of "boil" water orders issued to campers,
- The non-availability of ice,
- Closure of lavatories and flush toilets, and
- Frequent lodge swimming pool closures.

Because the water distribution system is located in the prime visitor use area (lodge, marina, cottages, campground), the impact of maintaining the deteriorating line would have a direct short and long-term, moderate, adverse effect on the visitor experience due to the disruption associated with road and area closures, as well as noise, traffic, and the visual intrusion associated with maintenance activities.

The 16-mile transmission line follows the shoulder of the main park road. Frequent line repairs would have a direct, short and long-term, minor, adverse effect on the visitor experience, requiring work crews to manage traffic during the repair operation; thus, distracting the visitors attention from the scenic values associated with this national park experience.

The continued use of disinfected, but unfiltered water (no human contact) at the West Lake comfort station would have a direct, long-term, negligible effect on the visitor experience because visitors would still be inconvenienced by having to use hand-sanitizers provided by the park.

Cumulative Effects. Depending on the values and interests of each visitor, a scene containing developed area infrastructure and operational activities could have a beneficial or adverse incremental effect. Some might interpret the scene as a desirable indicator of what is necessary to support a desired recreational development and opportunity. Others might interpret the scene as an encroachment on this tropical landscape scene. Because the main attraction of this isolated development is recreational in nature, as evidenced by the lodge, cottages, campground, and marina, it is unlikely that the scene would generally be considered more than a negligible or minor, adverse, short-term, cumulative effect on the visitor experience, especially when considered in the context of a park that comprises more than a million acres.

Conclusion. The no action alternative would have a direct, moderate, adverse effect on visitor use and experience due to the deteriorating condition of the existing water treatment system and the resulting frequent potable water outages that would be expected to occur for both the short and long-term. Continued and increasing maintenance activity associated with the repair of this deteriorating system would have a direct, short and long-term, moderate, adverse impact on the visitor experience because the transmission and distribution lines are within or visible from primary visitor use areas.

Impacts to Visitor Use and Experience of Alternative B: The Preferred Alternative

The preferred alternative would have a direct, short and long-term, moderate beneficial effect on the visitor experience because the new reverse-osmosis system would consistently meet drinking water standards, eliminating or substantially reducing the number of "boil water" orders that have in the past adversely affected the visitor experience.

Under this alternative, a new reverse-osmosis treatment system, rehabilitated distribution lines in conjunction with the elimination of the presently unreliable water supply from the two existing wells and 16-mile water transmission line would have a direct, short and long-term, moderate, beneficial effect on the visitor experience by providing an effective, efficient, and dependable supply of potable water for present and future needs of the Flamingo developed area.

The evaluation and replacement construction (pipe bursting) of deteriorated sections of the distribution line within the primary visitor use area would have a direct, short-term, moderate, adverse impact due to road and area closures, noise, traffic, and the visual intrusion associated with construction activities.

Once the distribution line has been evaluated and the replacement construction of selected pipe sections is complete, the rehabilitated line system would have a direct, long-term, moderate, beneficial effect on the visitor experience due to the limited amount of repair that would be needed with a fully rehabilitated distribution system.

The capping and abandoning of the two existing wells and 16-miles of transmission water line would have a direct, long-term, minor beneficial effect on the visitor experience by eliminating the distractions now associated with line repairs that occur along the main park road.

The existing wells and the 16-mile transmission line would be abandoned and no longer provide water for the West Lake comfort station flush toilets. Under this alternative, a new pump and 50 foot pipe would take untreated and unfiltered surface water from West Lake to provide water for the flush toilets. This action would have a direct, long-term, negligible, adverse effect on the visitor experience because visitors would still be inconvenienced by having to use hand-sanitizers provided by the park.

The two days required for the installation of the reverse-osmosis system would have a direct, short term, minor, adverse effect on the park because the park would have to issue a "boil water" order for that time period that would inconvenience visitors.

The distribution line replacement (pipe bursting) at the "Plug" would have a direct, short term, negligible adverse effect on the visitor experience, causing a disruption to boating and canoe activities that presently occur at this location.

Cumulative Effects. Depending on the values and interests of each visitor, a scene containing developed area infrastructure and operational activities could have a beneficial or adverse incremental effect. This cumulative effect would be somewhat less with the preferred alternative because of the more compact location and operational impact of

the alternative due to the abandonment of the existing wells and 16-mile transmission line. Some might interpret the scene as a desirable indicator of what is necessary to support a desired recreational development and opportunity. Others might interpret the scene as an encroachment on this tropical landscape scene. Because the main attraction of this isolated development is recreational in nature as evidenced by the lodge, cottages, campground, and marina, it is unlikely that the scene would generally be considered more than a negligible or minor, adverse, short-term, cumulative effect on the visitor experience, especially when considered in the context of a park that comprises more than a million acres.

Conclusion. The preferred alternative would have a direct, short and long-term, moderate beneficial effect on the visitor experience because the new reverse-osmosis system would consistently meet drinking water standards along with providing an adequate and reliable drinking water supply for present and future visitor needs. Although the reverse-osmosis system is maintenance intensive, the maintenance activities would be more localized to the maintenance area. This more localized maintenance activity would have a direct, long-term, minor to moderate beneficial effect on the visitor experience due to reduction of maintenance activities occurring in areas that are within or visible from primary visitor use areas.

PARK OPERATIONS

Affected Environment

The superintendent at Everglades National Park is responsible for managing the park, its staff, concessionaires and residents, all of its programs, and its relations with persons, agencies, and organizations interested in the park.

Park staff provide the full scope of functions and activities to accomplish management objectives and meet requirements in law enforcement, emergency services, public health and safety, science, resource protection and management, visitor services, interpretation and education, community services, utilities, housing, and fee collection.

Staff duties associated with the water treatment plant include:

- Monitoring of flow rates, chlorine/ammonia gas system, nutrients, and contaminants;
- Maintenance of collection, transmission and distribution systems including wells, well house electrical system, chlorination facility, pipelines, filters, and lift stations; and
- Operation of the maintained facilities.

Monitoring, maintenance and operation of the existing water treatment plant requires the knowledge, skill and labor of two full time licensed operators, one fulltime electrician and one fulltime plumber. Currently the park is short staffed by one operator and one electrician. The duties normally assigned to these positions are currently being covered, to the greatest extent possible, by existing staff.

Additional burden is placed on the staff due to the distance between facilities. The existing well site is located 16-miles northeast of the water treatment plant. These wells can be remotely operated from the plant, however, inspection and maintenance of the wells requires regular trips to and from the well site.

Impacts to Park Operations of Alternative A: No Action/Continue Current Management

As stated in the affected environment, the park is currently under staffed to adequately operate and maintain the water collection, treatment and distribution system. This situation results in direct, short and long-term, minor, adverse effects related to the over

utilization of existing staff. The problem is compounded by the age and maintenance intensity of the existing system components, and the distance between the water treatment plant and the well site.

The existing system components range widely in age and reliability. Portions of the system are in an advanced stage of deterioration, requiring constant attention. Issues of concern include:

- Continual maintenance of the well house due to an unnecessarily complex electrical system,
- Monitoring of chlorine/ammonia gas system,
- Electrical surges at treatment plant, and
- The constant repairing of old, leaking transmission and distribution lines.

The added time needed to repair and maintain the system take staff away from normal duties, and in some cases additional time and resources are required in order to educate the public about the repairs taking place.

The length of the transmission line and the distance between the existing wells and the water treatment plant brings about added difficulty in managing the water treatment system. Currently, staff are required to travel 32-miles round trip every time the well site needs to be visited. Consequent effects to park operations are direct, short and long-term, moderate and adverse, and are attributed to difficulty in scheduling, increased response time, and increased down/travel time.

Concern for park staff health is raised by the use of chlorine and anhydrous ammonia gas at the existing well site. Both of these gases are potentially harmful or fatal to humans. Currently these gasses are delivered by a vendor and there has been no known illness or injury associated with either. This threat is considered negligible, long-term, and adverse.

A final issue raised under this alternative is the distribution of water to the West Lake comfort station. Currently this water is drawn from the transmission line at a rate of approximately 100 gallons per day, and is used only to flush toilets at the facility. The additional operational demand on park staff has a negligible, long-term, adverse effect on park operations.

Cumulative Effects. In addition to duties related to the water treatment plant, the operator and support staff operate and maintain the Flamingo wastewater treatment plant. This plant and its associated collection system are also comparatively antiquated and maintenance intensive, adding considerably to park staff workloads. Maintenance, operation, and repair of these plants would continue at current levels and the potential exists for current conditions to worsen as the plants age.

Conclusion. The no action alternative would not result in any changes to existing negligible to moderate, short and long-term, adverse effects to staffing and scheduling, brought about by the over utilization of current staff, dispersed locations of the various components of the water treatment system, and the age of some of these components. These conditions would continue.

Alternative A would not produce major adverse effects on park operations whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of park operations as a result of the implementation of the no action alternative.

Impacts to Park Operations of Alternative B: The Preferred Alternative

The preferred alternative would not involve the hiring of new staff. The current need for a licensed operator and electrician would not be satisfied, and therefore, effects due to short staffing would persist. There would, however, be some differences in effects to park operations between the alternatives.

Three licensed operators would require training on the new reverse-osmosis equipment. In the short-term, this would cause some difficulty related to the time involved in training and a continued lack of qualified staff while training is occurring. Resultant impacts would be indirect, negligible to minor and adverse.

In the long-term, once trained, emphasis would be focused on maintenance of the water treatment plant and less on the wells due to system improvements (new pumps and electrical system). The preferred alternative would involve less maintenance than the no action alternative because the collection (wells) would be new and the distribution systems would be rehabilitated. The existing wells (including the chlorination facility), 16-miles of transmission line would no longer be in service. As such, the components of the water treatment system needing the most attention would be effectively removed, resulting in long-term, minor to moderate, beneficial effects to park operations.

Although the use of chlorine/ammonia gas would not occur under the preferred alternative, the reverse-osmosis system proposed for this alternative would not alleviate all transport/handling of hazardous chemicals. Sulfuric acid may be utilized in the proposed system and would need to be transported/handled. Also, the public, per regulations established by the Environmental Protection Agency, has the right to know when and where sulfuric acid is being used. Public notices would therefore be required. This trade-off of hazardous chemicals negates some of the beneficial affects brought about by ceasing the use of chlorine/ammonia gas, however, a direct, long-term, minor, beneficial impact would be observed due to the greater potential for problems associated with the use of chlorine/ammonia gas.

Under this alternative, water used at the West Lake comfort facility would no longer be drawn from the transmission line, and a new collection system would need to be installed. This system would include an 50 foot length of pipe running from the facility to West Lake, a retention box (used to prohibit entry of debris or wildlife into the pipe), and a small pump capable of drawing 100 gallons per day from the lake to an existing 500 gallon holding tank. This short-term installation operation would be considered a negligible, adverse impact to park operations since the work would be done by a contractor, and would not affect park staff. No additional effects would be related to operation and maintenance of the new system because it would not burden staff any more than the existing system.

Cumulative Effects. Everglades National Park has proposed two relatively large-scale projects in Flamingo, including a wastewater treatment plant upgrade and a road realignment. The cumulative burden placed on staff as a result of working on and overseeing these projects as well as educating the public about them and why they are necessary would cause negligible to minor, short and (depending on the extent and length of the project) long-term, adverse impacts to park operations.

These impacts are, however, somewhat offset by the cumulative beneficial effects associated with the removal of these antiquated, maintenance intensive systems and the installation of new more reliable ones. Long-term, minor to moderate, beneficial, cumulative effects would accrue from this replacement.

Conclusion. The preferred alternative would result in some short-term, negligible to minor,

adverse effects to park operations related to the training of staff on the new, more technically demanding system, and overseeing and working on the proposed project. Short and long-term, minor to moderate, beneficial effects would include the removal of existing antiquated, maintenance intensive systems and the installation of new more reliable ones.

Alternative B would not produce major adverse effects on park operations whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of park operations as a result of the implementation of Alternative B.

UNAVOIDABLE ADVERSE IMPACTS

The Flamingo developed area was originally constructed on fill material within the coastal plain. The site includes visitor facilities, park housing, and operations components. Beyond the immediate vicinity, the hydrology and vegetation of the region have been disturbed by large-scale water control and management structures placed throughout the Everglades ecosystem. Neither alternative considered for this analysis would remove or substantially change the effects of these actions on the project area.

CONSULTATION AND COORDINATION

Scoping is the effort to involve agencies and the general public in determining the scope of issues to be addressed in the environmental document. Among other tasks scoping determines important issues and eliminates issues not important; allocates assignments among the interdisciplinary team members and/or other participating agencies; identifies related projects and associated documents; identifies other permits, surveys, consultations etc. required by other agencies; and creates a schedule which allows adequate time to prepare and distribute the environmental document for public review and comment before a final decision is made. Scoping includes any interested agency, or any agency with jurisdiction by law or expertise (including the Advisory Council on Historic Preservation, the State Historic Preservation Officer, and Indian Tribes) to obtain early input.

The Seminole and Miccosukee tribes have demonstrated interest in the areas near Flamingo at Everglades National Park. The park sent letters regarding the proposed action to these tribes on May 24, 2002. Copies of the letters sent to the tribal representatives can be found in Appendix B.

During development of this environmental assessment, the park contacted the national Advisory Council on Historic Preservation in Washington D.C. and the Florida State Historic Preservation Officer regarding the project. A copy of the letter sent to the Florida State Historic Preservation Officer and Advisory Council can be found in Appendix B.

The U.S. Fish and Wildlife Service was contacted by letter regarding this project on May 16, 2002. A copy of this letter requesting verification of threatened and endangered species in the project area is located in Appendix B.

The Florida Department of Environmental Protection was contacted regarding this project on May 24, 2002. This letter may also be found in Appendix B.

PLANNING TEAM PARTICIPANTS

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Mark Norman	Environmental Scientist	Parsons
Don Kellett	Environmental Scientist	Parsons
Connie Chitwood	Statement of Finding Specialist	Parsons

LIST OF RECEIPTS THAT RECEIVED PUBLIC SCOPING BROCHURE (APPENDIX D)

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APPENDIX A-FLOODPLAIN STATEMENT OF FINDING

STATEMENT OF FINDINGS

FOR

EXECUTIVE ORDER 11988 (FLOODPLAIN MANAGEMENT)

Water System Improvements

Environmental Assessment

Everglades National Park

Recommended: _____

Superintendent, Everglades National Park, NPS Date

Concurred: _____

Chief, Water Resources Division, Washington Office, NPS Date

Concurred: _____

Southeast Regional Safety Officer, NPS Date

Approved: _____

Regional Director, Southeast Region, NPS Date

INTRODUCTION

Pursuant to Executive Order 11988 (Floodplain Management), and the National Park Service 1993 Floodplain Management Guideline for implementing the executive order, The National Park Service has evaluated flooding hazards for improvements to the water treatment plant in the Everglades National Park at Flamingo, Florida. This statement of findings describes the proposed action, project site, floodplain determination, use of floodplain, investigation of alternatives, flood risks, and mitigation for the continued use of the water treatment plant within the 100-year floodplain.

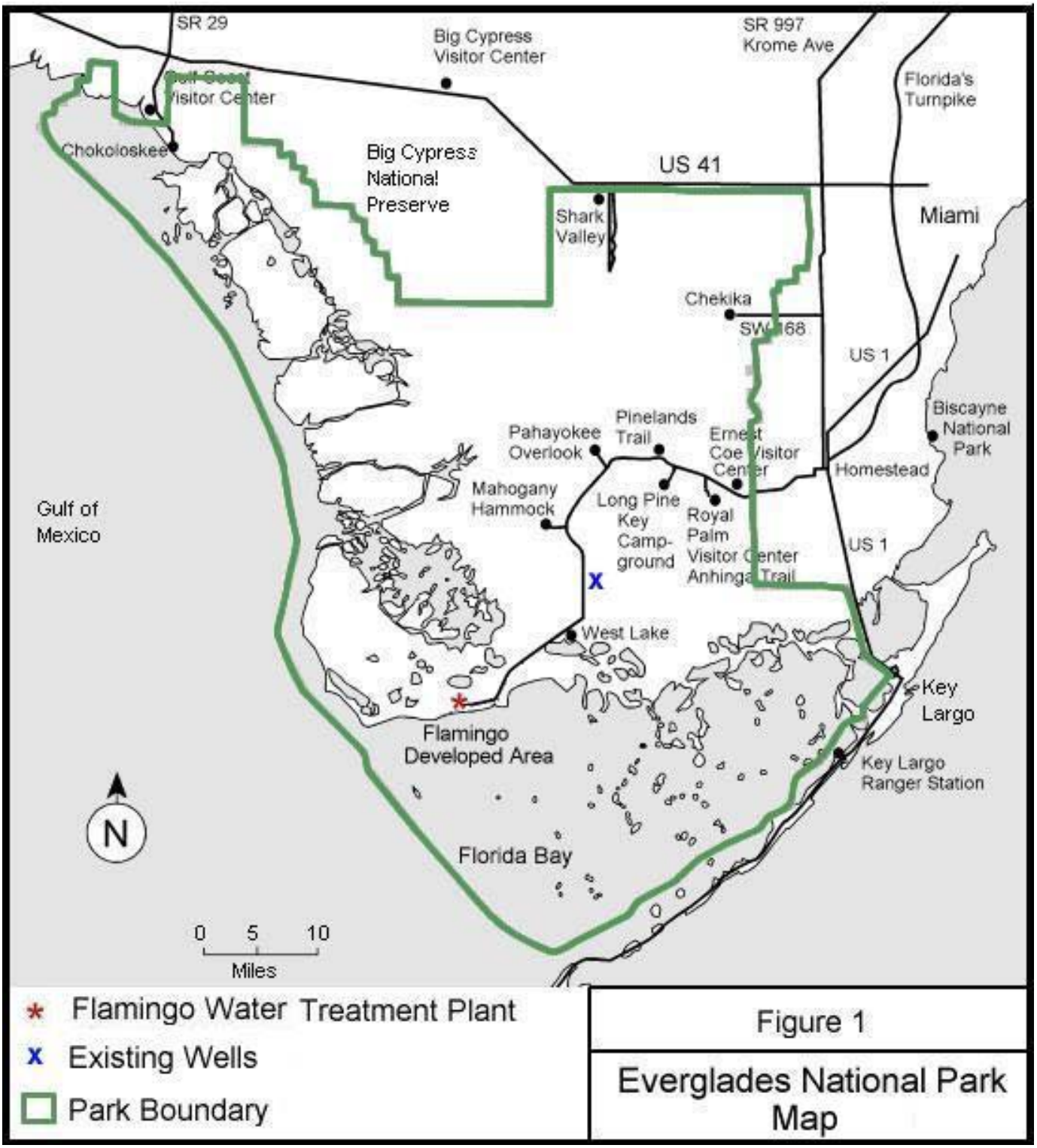
Proposed Action

The National Park Service proposes to improve the existing water treatment facilities, transmission, and distribution lines which serve the Flamingo developed area of Everglades National Park for the purpose of providing safe drinking water for current and future water demand. The project involves replacing an existing nanofiltration system with a new reverse-osmosis system using the existing water treatment structure and water storage tank. Water is obtained and transmitted by two new saltwater wells and a supply line to be installed within close proximity to the existing treatment plant. An existing pipe connected to the treatment plant would be extended along an existing road 300 feet north where brine water from the treatment plant would be discharged into an existing percolation pond. Two existing freshwater supply wells and 16-miles of transmission lines dating from the 1950's would be purged, capped and abandoned, and any existing support structures removed from the site. The new reverse-osmosis system would provide an effective, efficient and reliable water treatment system compliant with Florida's Safe Water Drinking Water Act 1974 (amended) and the operating requirements and regulations of the Florida Department of Environmental Protection.

Project Site

Everglades National Park is located in Monroe County, Florida 50 miles southwest of Miami and covers 1,509,000 acres of the southernmost tip of Florida (Figure 1 and Figure2). The project involves two sites connected by a water transmission line, a percolation pond site, and a distribution line. The improvement site is located at the Flamingo water treatment plant in the Flamingo developed area zone just south of route 9336 less than a mile from Florida Bay coastline. The existing plant, distribution system, and percolation pond is supplied by two existing freshwater wells located at the second project site. These supply wells and transmission line are located outside of the park's development zone 16 miles northeast of the Flamingo water treatment facilities. The percolation pond site is located 500 feet north of the water treatment facilities.

A disinfection treatment system at the well site removes organic compounds from the fresh well water and is piped 16-miles through a 6-inch asbestos-cement transmission line. The water is transported to the Flamingo water filtration plant and then into the underground distribution system. Constructed in the mid-1950s, the deteriorated distribution system leaks 20-30 gallons per minute. These leaks prevent adequate flow and pressure necessary to operate the nanofiltration system installed at the water treatment plant built in 2001.


SR 29
Big Cypress Visitor Center
SR 997 Krome Ave
Florida's Turnpike
Gulf Coast Visitor Center
Chokoloskee
Big Cypress National Preserve
US 41
Shark Valley
Miami
Chekika
SW 168
US 1
Biscayne National Park
Pahayokee Overlook
Pinelands Trail
Ernest Coe Visitor Center
Homestead
Mahogany Hammock
Long Pine Key Camp-ground
Royal Palm Visitor Center
Anhinga Trail
US 1
Gulf of Mexico
West Lake
Key Largo
Flamingo Developed Area
Key Largo Ranger Station
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0 5 10
Miles
* Flamingo Water Treatment Plant
x Existing Wells
Park Boundary
Figure 1
Everglades National Park Map

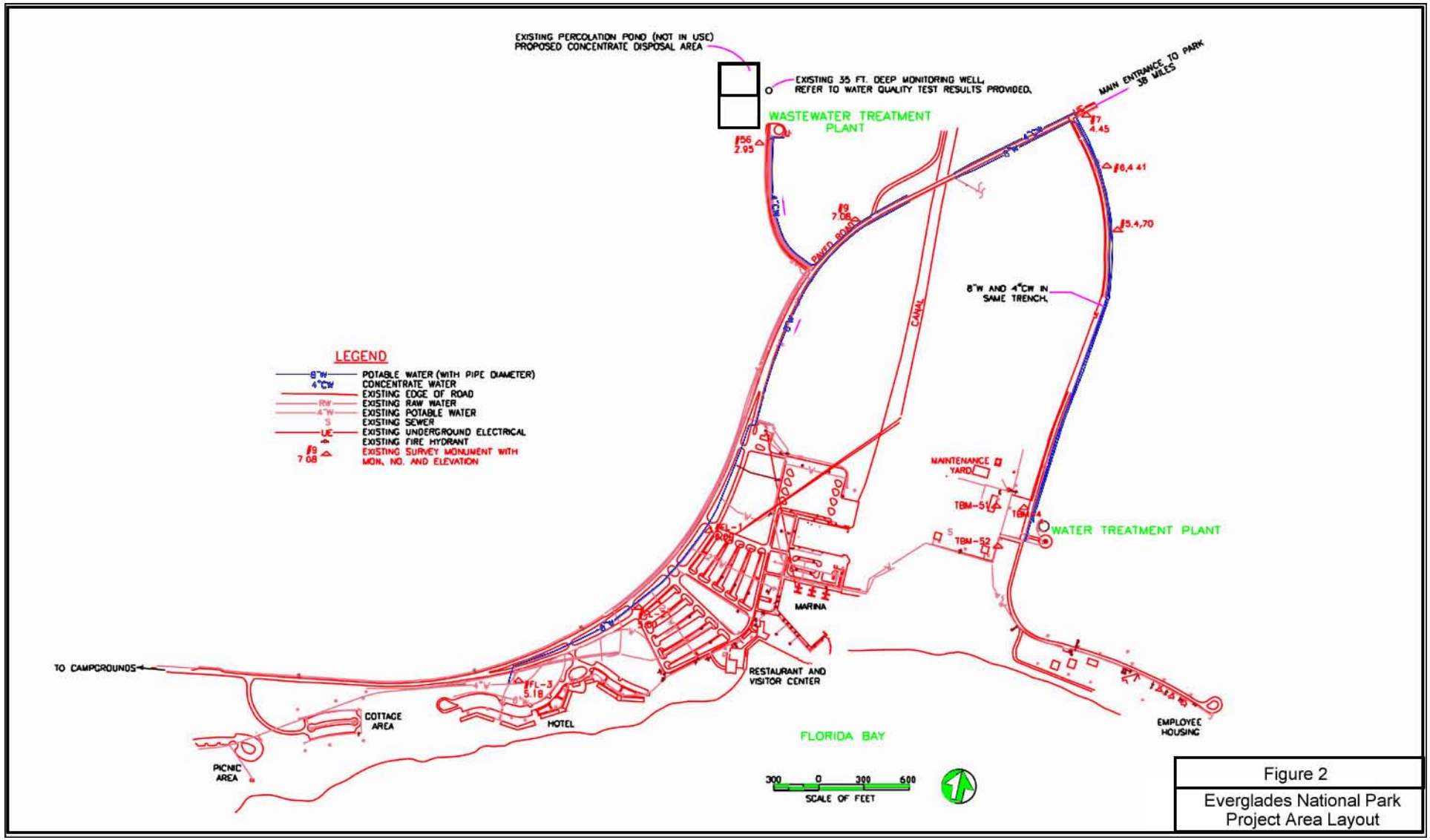


Figure 2

Everglades National Park
Project Area Layout

Floodplain Determination

Topography throughout the park is characterized by low elevation and broad areas of very low relief less than 10 feet above sea level. The water treatment plant, percolation pond, transmission, and distribution lines as well as the supply wells and transmission system are located within the coastal zone 100-year floodplain (Figure 3). Flood Insurance Rate Map (12087C 750 G March 3, 1997) shows the water treatment plant is located in the AE-zone.

In the coastal floodplain the AE zone is further classified into base flood elevations derived from hydraulic analysis used for structural engineering designs. The water treatment plant area is located in the AE 10. The two water supply wells and a portion of the transmission lines are located at slightly higher elevations within the AE 9 along with the existing percolation pond. Lands immediately adjacent and 100 feet coastward of the AE- 10 zone are located in the VE-zone and are subject to three-foot waves and storm surges. Current water distribution lines are located in both the VE 7-zone and the VE 3-zones. High-hazard areas are a Class III action as defined by the National Park Service Floodplain Management Guidelines (National Park Service 1993). Facilities located in these areas are required to meet South Florida Building Codes and Monroe County floodplain management standards.

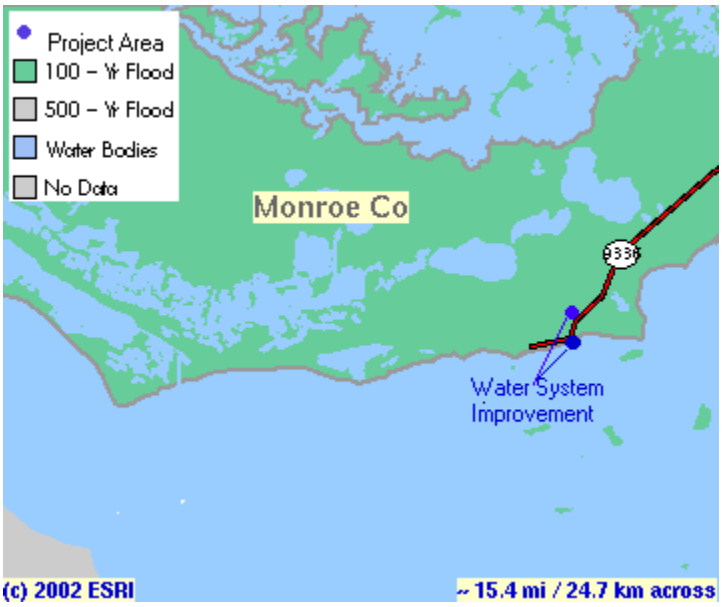


Figure 3. Location of 100-year floodplain

Use of the Floodplain

Since the establishment of Everglades National Park in 1947, the parks mission has been to preserve resources inclusive of hydrological conditions within the park and the South Florida ecosystem. Subsequent agricultural and residential development surrounding the park has increased over the years and substantially changed the hydrology. South Florida's infrastructure of canals, levees and water control structures were created to manage and drain excess water throughout agricultural and developed areas during the wet season. Coastal canals are kept at low levels during the wet season to store and convey floodwaters. The canals and levees are managed to protect developed and agriculture areas surrounding the park from flooding and to control water elevations.

The existing water treatment plant site has historically housed and provided water treatment services for the developed area of the park and the developed area is adequately sized to add two new supply wells and extend the brine distribution line. Considering the existing park infrastructure, limited availability of developed land and the location of existing park facilities, the most practicable site alternative is to install the two new wells at the existing water treatment facility. The alternative also makes use of an existing percolation pond and the retrofitting of the existing treatment plant building into a reverse-osmosis system thereby minimizing any additional construction in the floodplain.

The risk of flooding is reduced by consolidating the supply wells at the water treatment site which would attain the widest range of beneficial uses of the environment, biological, visitor safety and enjoyment, cultural resource protection without degradation of park resources. There would be a higher level of health and safety for visitors and park employees by providing a dependable supply of potable water. Reverse-osmosis provides an efficient reliable treatment system for long-term water supply. Purging and abandonment of the leaky transmission lines would also reduce the impact to the surrounding wetlands. Although the action would disturb some 300 linear feet of 100-year floodplain brine distribution lines and to replace water distribution lines, surface grades would be restored. No increase in impermeable surface resulting in surface runoff would occur therefore there would be a negligible, direct, short-term adverse impact to the floodplain.

Investigation of Alternatives and Flood Risk

Because the entire park lies in the 100-year floodplain park facility development, rehabilitation, or reconstruction in the floodplain has historically been the only practicable alternative. An analysis of the comparative flood risk between three alternatives is summarized below. Alternatives considered for the water treatment improvements that may involve less flood risk include: connecting to an existing municipal water system, continuing current operation, maintenance and management, or improve the existing system.

High-risk coastlines are those that have low coastal elevations, erodible substrate and high wave and tide energy. Assessing potential impacts from a coastal hazard involve evaluating risk of exposure of life and property to a flood event and consequences of that exposure. For Everglades National Park this requires consideration of risk and protection of visitors, park staff, concessionaires, property, and essential infrastructure to coastal flooding.

Public visitors and most park and concessionaire staff other than maintenance crews would not typically utilize the water treatment facility area(s) making it a lesser risk to life. Implementation of the Everglades National Park Hurricane Plan further minimizes potentially life-threatening hazards by providing a park wide warning and evacuation plan during the hurricane season. The major flood risks therefore include loss of function by facilities, essential roads and utilities, and service outages for potable water.

The National Park Service considered connecting with the municipal water system located in Homestead, Florida. This alternative would extend the water transmission lines and require construction of pump stations at higher elevations at decentralized locations. Extending the transmission lines an additional 30-miles northeast of the park would require expanding outside of the Flamingo development zone and increases the disturbance within natural areas of regional importance. It would also encourage additional commercial and residential development on agriculture lands adjacent to the park. This action would require more construction within the 100-year floodplain thereby increasing the risk of structural damage caused by flooding and reducing efficiency by increasing the service delivery time for potable water systems.

Continuing the current operation would require additional maintenance of the deteriorating 16-mile water transmission line to prevent leaching of chloramine treated water into the floodplain while pumping the water to the water treatment plant. An efficient potable water operation would not be provided over the long term because of continued reliance on the existing chloramine injection unit to remove contaminants from the well water. Distribution lines would be repaired or replaced as needed. Maintenance and operations may be inconsistent because repairs would be conducted on an as needed basis. Achieving federal, state and local water quality standards would not be consistent. This action would increase flood risks by continued exposure of the deteriorated pipes to flood waters, which could contaminate the drinking water, supply. In addition inundation could weaken the pipes further causing sinkholes in essential roads. Flood damage risks would increase through loss of function and time necessary to restore a fully functioning water supply.

Alternatively, the existing temporary chloramine injection unit could continue to be used to decontaminate the well water and the transmission and distribution lines would be improved. The National Park Service considered replacing the leaking 16-mile transmission line to provide sufficient water pressure for adequate operation of the existing nanofiltration unit. Installation techniques such as "slip line or pipe bursting" 16-miles of transmission line designed to minimize impacts to floodplains and wetlands would be prohibitively expensive. Replacement of the leaky water transmission line would minimize the risk of floodwaters contaminating the water supply but have more potential adverse effects through disturbance of floodplains due to line maintenance over the long term. Continuing chloramines decontamination would require use and storage of chemicals such as chlorine, ammonia, phosphate, and Aquamag ® in the 100-year floodplain. Frequent maintenance of the existing deteriorating freshwater wells would continue to be labor intensive which may decrease operation efficiency. Deterioration of the older well structures would increase making them vulnerable to damage; loss of function and contamination from flooding over time but the risk to new transmission lines would be negligible.

Flood Risk of Project Site

Everglades National Park is located in a high-hazard area and is subject to high groundwater levels, flooding and tides. Hydrologic conditions in the park are influenced by both weather and the water management operations of the central and south Florida project. During small storm events rainwater generally drains from larger uplands and surrounding areas through Shark River and Taylor Slough's into Florida Bay. Surface drainage in the park during the less than 10-year event are controlled by the natural wetlands and to a lesser extent; East Cape, Homestead and Buttonwood Canals help to divert drainage around the Flamingo developed zone. During larger storm events tides and wind tides increase, groundwater levels rise, canals would fill, overtop, and portions of the Flamingo developed area may be inundated.

Normally the water treatment area would only be threatened by inundation from the less frequent 100-year storm event or, a one percent chance of the flood being equaled or exceeded in magnitude in any given year. Larger tropical storm events particularly hurricanes would expose the water treatment plant, new wells, percolation pond, water transmission and distribution lines in the immediate project area to coastal flooding and high velocity winds that could be threatening to life and property. During Hurricane Andrew, 1992, wind forces reached 74 miles per hour (or greater) and the documented storm-tide elevation at the Flamingo development area ranged from 4 – 5 feet above sea level.

High wind velocities combined with storm tides could be capable of increasing tidal elevations in the Flamingo area anywhere from 2 to 5 feet for a category 1 event to close to 7 feet above the norm for a category 2 event and wind velocities up to and exceeding 100 miles per hour. Coastal flooding combined with waves could impact structures sufficient to destroy walls and undermine foundations and erode

protective beaches. Risks for water treatment are evaluated by identifying loss of function by facility, loss of utilities, and loss of service for supplying drinking water. Storm duration is the main factor that influences the risk of exposure to people and property.

Public visitors do not use the water treatment area and most park staff other than maintenance crews would infrequently be present reducing risk to life. The Everglades National Park Hurricane Plan further reduces life-threatening flood hazards by issuing a warning and evacuation plan during the hurricane season (June 1 to November 30). Tropical storm tracking, position estimates and intensity forecasts are conducted several times daily. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Intensity forecasts use surface wind and radial extent in quadrants relative to the storm center to predict when the storm will hit land. Warnings are initiated within 72 hours before landfall of the pending tropical storm and once enacted the evacuation is park-wide.

The water treatment facilities are in close proximity to Buttonwood Canal and are afforded some flood protection by being elevated above the canal and base flood elevation. The existing water treatment plant is adequately anchored by columns elevated 10 feet above grade and include protection against high winds in accordance with South Florida Building Code and the Monroe County Code of Ordinances Article VII – Land Use Districts, Division 6 Floodplain management standards. Electrical and mechanical equipment is also elevated and protected beyond base flood elevation.

Mitigative Actions

The proposed action would centralize the wells and supply transmission line at one water treatment site, remove the supporting structures at the current well site, and reduce the overall developed footprint in the 100-year floodplain. Abandonment of the leaky transmission and deteriorating distribution lines would reduce direct disturbance of the floodplain and sensitive wetlands by removing the need for long-term maintenance. It would also stop the leaching of chemically treated water along the 16-mile transmission line. However because these life essential facilities are located in a high hazard area the risk to property cannot be eliminated but can be reduced through mitigation.

In accordance with EO 11988 flood protection was provided for the existing water treatment plant facilities by elevating and securing the structure on piles above flood level rather than by fill. Existing water transmission valves are located in concrete vaults with metal lids to prevent erosion and scour from exposing the water mains and service connections. Installation of the reverse-osmosis system would not require filling or changing existing surface elevations and would remain consistent with the footprint of the existing facility.

Sustainable flood mitigation for the two new water supply wells would be designed so that floodwaters do not enter or accumulate within system components and contaminate the potable water supply system. The new water wells would be encased in a watertight casing designed to withstand the effects of velocity flow, wave action, and debris impacts. The casing would extend from one foot above grade to 25 feet below grade with a protective well cover. Service feed lines from the wells to the treatment plant would either be elevated above the design flood elevation or be properly embedded to minimize damage from surface erosion caused by flooding.

To prevent contamination or damage of the water supply distribution system valves or meters would be protected from debris impact, velocity flow, wave action and erosion. Feed pipes and meters would be located on the landward side of residential, concessionaire, public and life essential buildings.

The National Park Service would continue to operate these facilities using the Everglades National Park Hurricane Plan, an operational hazard implementation plan that lowers the threat to life and property. This plan is coordinated with the Dade, Collier and Monroe County Departments of Emergency Management. The plan is reviewed and updated annually to ensure maximum human safety.

Summary

This proposed action constitutes the continuation of a risk to life and property reduced by implementation of sustainable flood mitigation designs and park mitigation plan. The National Park Service water treatment plant improvements would consolidate the potable water treatment facilities and operations in a coastal flood hazard area. No fill, alteration of sand beach, or wetlands that would increase potential flood damage would be needed for structural support of the two wells, the transmission line, extended discharge line or the replacement of the existing distribution lines. The park would continue to implement the Everglades National Park hurricane hazard plan to protect and lower the risk to life and property during tropical storm season from June to November. This plan will be reviewed and updated annually. Flood losses would be reduced by ensuring that new and substantially improved construction in flood prone areas is protected from flood damages.

By using existing or previously abandoned water treatment facilities and minimizing and restoring any land disturbance, the project continues to protect local and regional areas of unique natural beauty, wetlands, and wildlife and avoids adverse environmental impacts to the maximum extent.

Finally, the project would provide effective life essential water treatment and efficient operations by combining the water supply with the existing treatment system thereby reducing the transmission time and ensuring compliance with state and local water quality standards.

REFERENCES

Federal Emergency Management Agency

1997 Multi Hazard Identification and Risk Assessment The Cornerstone of the National Mitigation Strategy. 369 pp

1999 Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems.

2001 Modernizing FEMA's Flood Hazard Mapping Program: Recommendations for Using Future-Conditions Hydrology for the National Flood Insurance Program. 29 pp.

Flood Insurance Rate Map 12087C 750 G March 3, 1997.

Florida New Statewide Building Code, 2001.

Monroe County

1979 Monroe County Code, General Ordinances of the County Adopted July 31, 1979, effective October 1, 1979. Codified through Ordinance Number 42-2001, enacted Dec. 19, 2001. Supplement No. 75.

Nodarse & Associates

1997 Report of Subsurface Exploration and Geotechnial Engineering Evaluation, Flamingo Water Treatment Facility and Tank (Task Order No. 1), Everglades National Park, Monroe County, Florida

South Florida Water Management District

2000 Lower East Coast Regional Water Supply Plan, Planning Document.

U.S. Department of the Interior

2000 Department Environmental Quality Manual. Part 520 Protection of the Natural Environment.

U.S. Department of the Interior, National Park Service

1993 Floodplain Management Guideline. 14 pp.

1998 Flamingo Water Treatment Plan Improvements Environmental Assessment Everglades National Park, Florida.

2001 Directors Order # 12. Conservation Planning, Environmental Impact Analysis and Decision-making.

2001 Site Plan - Water Treatment Area. Drawing No. 160, 41,035B. 3 of 5 sheets.

APPENDIX B- COMPLIANCE/CORRESPONDENCE

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

REPLY REFER TO:
D1815

MAY 24 2002

Mr. Don Klima
Advisory Council on Historic Preservation
Old Post Office Building
1100 Pennsylvania Avenue, NW, Suite 809
Washington, DC 20004

Reference: Re: Everglades National Park, Scoping for Environmental Assessments for Proposed Flamingo Potable Water System Improvements and Proposed Flamingo Wastewater System Improvements

Subject: Section 106 Compliance

Dear Mr. Klima:

The National Park Service (NPS) has initiated planning to upgrade the Flamingo potable water system and the Flamingo wastewater system, both located within Everglades National Park, Monroe County, Florida. The goal of these projects is to provide safe, reliable drinking water and wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for each project. Scoping brochures with maps and project information are enclosed for your review.

Although we are just beginning to gather information for these projects, we believe that their eventual implementation may affect properties that may be eligible for inclusion in the National Register of Historic Places. Therefore, we would like to invite your office to participate in the development of this planning effort in accordance with 36 CFR 800, and with the 1995 Servicewide Programmatic Agreement among your office, the National Conference of State Historic Preservation Officers, and the National Park Service.

This letter also is to notify your office that we plan to use the environmental assessment process to accomplish compliance for both Section 106, in accordance with the National Historic Preservation Act, as amended, and the National Environmental Policy Act (as described in 36 CFR 800.8 (a-c)), and to analyze potential effects from proposed implementation of this plan.

We would appreciate your careful consideration of the enclosed materials. As soon as the draft environmental assessments are completed, we will send them to you for your

review and comment. We look forward to your participation in the planning process. We believe that it will ensure that cultural resources are adequately considered during the planning process.

Should you have any questions or desire additional information, please contact Brien Culhane, Chief, Planning and Compliance at Everglades National Park, by calling 305-242-7717 or by email at brien_culhane@nps.gov.

Sincerely,

Maureen Finnerty
Superintendent

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

REPLY REFER TO:

D1815

MAY 24 2002

Mitchell Cypress, Acting Chairman
Seminole Tribe of Florida
6300 Stirling Road
Hollywood, Florida 33024

Reference: Re: Everglades National Park, Scoping for Environmental Assessments for Proposed Flamingo Potable Water System Improvements and Proposed Flamingo Wastewater System Improvements

Reference: Consultation Regarding Ethnographic Resources

Dear Chairman Cypress:

The National Park Service (NPS) has initiated planning to upgrade the Flamingo potable water system and the Flamingo wastewater system; both located within Everglades National Park, Monroe County, Florida. The goal of these projects is to provide safe, reliable drinking water and wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for each project. Scoping brochures with maps and project information are enclosed for your review.

Information gathering for these projects is just beginning and we want to be sure that they will not affect ethnographic resources. Ethnographic resources are defined by the National Park Service as any natural or cultural resource, landscape, or natural feature which is linked to the traditional practices, values, beliefs, history, and/or ethnic identity of a cultural group or groups.

We are sending notification of these projects to your office to help ensure that they will not negatively impact ethnographic resources with a cultural affinity to members of your tribe. We are hoping you will examine the enclosed map and descriptions of the proposed work. If you feel there may be resources that may be impacted by the projects, please do not hesitate to contact me at 305-242-7710 to discuss any concerns you may have. We would appreciate knowing of any initial concerns by June 10, 2002.

As soon as the draft environmental assessments are completed, we will send them to you for your review and comment. We look forward to your participation in the planning process. We believe that it will ensure that ethnographic resources are adequately considered during the planning process.

Thank you for your time and interest in these important projects.

Sincerely,

Maureen Finnerty
Superintendent

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

REPLY REFER TO:

MAY 24 2002

D1815

Billy Cypress, Chairman
Miccosukee Tribe of Indians of Florida
Mile Marker 70, US. 41, Tamiami Trail
Miami, FL 33194

Reference: Re: Everglades National Park, Scoping for Environmental Assessments for Proposed Flamingo Potable Water System Improvements and Proposed Flamingo Wastewater System Improvements

Subject: Consultation Regarding Ethnographic Resources

Dear Chairman Cypress:

The National Park Service (NPS) has initiated planning to upgrade the Flamingo potable water system and the Flamingo wastewater system; both located within Everglades National Park, Monroe County, Florida. The goal of these projects is to provide safe, reliable drinking water and wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for each project. Scoping brochures with maps and project information are enclosed for your review.

Information gathering for these projects is just beginning and we want to be sure that they will not affect ethnographic resources. Ethnographic resources are defined by the National Park Service as any natural or cultural resource, landscape, or natural feature which is linked to the traditional practices, values, beliefs, history, and/or ethnic identity of a cultural group or groups.

We are sending notification of these projects to your office to help ensure that they will not negatively impact ethnographic resources with a cultural affinity to members of your tribe. We are hoping you will examine the enclosed map and descriptions of the proposed work. If you feel there may be resources that may be impacted by the projects, please do not hesitate to contact me at 305-242-7710 to discuss any concerns you may have. We would appreciate knowing of any initial concerns by June 10, 2002.

As soon as the draft environmental assessments are completed, we will send them to you for your review and comment. We look forward to your participation in the planning process. We believe that it will ensure that ethnographic resources are adequately considered during the planning process.

Thank you for your time and interest in these important projects.

Sincerely,

John C. Dejarnette for

Maureen Finnerty
Superintendent

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE

Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO

D1815

May 24, 2002

Mr. Richard W. Cantrell
Director, District Management
Florida Department of Environmental Protection
South District
2295 Victoria Avenue, Suite 364
Fort Myers, FL 33901-3881

Re: Everglades National Park, Scoping for Environmental Assessments for Proposed Flamingo Potable Water System Improvements and Proposed Flamingo Wastewater System Improvements

Dear Mr. Cantrell:

The National Park Service is preparing environmental assessments to address options for improving the Flamingo potable water system and the Flamingo wastewater system, both located within Everglades National Park, Monroe County, Florida. The goal of these projects is to provide reliable water and wastewater treatment facilities that meet applicable treatment standards. Scoping brochures with background information and project descriptions are enclosed for your review.

Although more specific comments will be solicited during the permit coordination process and during review of the draft environmental assessments, we request that you review the enclosed information and provide us with any general comments you consider pertinent at this time. We would appreciate receiving your initial comments by June 10, 2002. Your comments can be sent to me at the address above, or by email at EVER_Flamingo_WW@nps.gov.

We look forward to working cooperatively with you on the planning and implementation of these projects. Should you have any questions about the planning process, please call me at 305-242-7717.

Sincerely,

Brien F. Culhane, AICP
Chief, Planning and Compliance

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

REPLY REFER TO:
D1815

MAY 24 2002

Ms. Janet Snyder Matthews
State Historic Preservation Officer
Division of Historical Resources - Bureau of Historic Preservation
Compliance and Review Section
R.A. Gray Building
500 S. Bronough Street
Tallahassee, FL 32399-0250

Reference: Re: Everglades National Park, Scoping for Environmental Assessments for Proposed Flamingo Potable Water System Improvements and Proposed Flamingo Wastewater System Improvements

Subject: Section 106 Compliance

Dear Ms. Matthews:

The National Park Service (NPS) has initiated planning to upgrade the Flamingo potable water system and the Flamingo wastewater system; both located within Everglades National Park, Monroe County, Florida. The goal of these projects is to provide safe, reliable drinking water and wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for each project. Scoping brochures with maps and project information are enclosed for your review.

Although we are just beginning to gather information for these projects, we believe that their eventual implementation may affect properties that may be eligible for inclusion in the National Register of Historic Places. Therefore, we would like to invite your office to participate in the development of this planning effort in accordance with 36 CFR 800, and with the 1995 Servicewide Programmatic Agreement among your office, the National Conference of State Historic Preservation Officers, and the National Park Service.

This letter also is to notify your office that we plan to use the environmental assessment process to accomplish compliance for both Section 106, in accordance with the National Historic Preservation Act, as amended, and the National Environmental Policy Act (as described in 36 CFR 800.8 (a-c)), and to analyze potential effects from proposed implementation of this plan.

We would appreciate your careful consideration of the enclosed materials. As soon as the draft environmental assessments are completed, we will send them to you for your review and comment. We look forward to your participation in the planning process. We believe that it will ensure that cultural resources are adequately considered during the planning process.

Should you have any questions or desire additional information, please contact Brien Culhane, Chief, Planning and Compliance at Everglades National Park, by calling 305-242-7717 or by email at brien_culhane@nps.gov.

Sincerely,

for Maureen Finnerty
Superintendent

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE

Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO:

D1815

May 16, 2002

Mr. Jay Slack
Field Supervisor
South Florida Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960

Dear Mr. Slack:

Re: Everglades National Park, Scoping for Environmental Assessments for Proposed Flamingo Potable Water System Improvements and Proposed Flamingo Wastewater System Improvements

Subject: Section 7 Consultation

The National Park Service (NPS) is preparing environmental assessments (EA) to address options for improving the Flamingo potable water system and improving the Flamingo wastewater system, both located within Everglades National Park, Monroe County, Florida. Background information and project descriptions are enclosed. We have also enclosed a table of the Federally listed endangered, threatened, and candidate species which our data suggest have the potential to occur in project areas.

To ensure that the park's planning effort adequately evaluates the potential effect that project implementation would have on threatened and endangered species, we would appreciate your review of the enclosed list.

In keeping with the requirements of Section 7 consultation and NPS policy, as soon as the draft environmental assessments are completed we will send you copies with an official transmittal letter for your review and comment.

We look forward to working cooperatively with you on the planning and implementation of these projects. If you have any questions or desire more information, please contact Skip Snow of our South Florida Natural Resources Center staff at (305) 242-7800 or at skip_snow@nps.gov

Sincerely,

Brien F. Culhane
Chief, Planning and Compliance

Enclosures

Table 6: Federally Listed Endangered, Threatened, and Candidate Species for Everglades National Park, Florida

Common Name	Scientific Name	Status	Potential to occur in project area
REPTILES			
American crocodile	*Crococylus acutus*	Endangered	Yes
Atlantic hawksbill turtle	*Eretmochelys imbricata*	Endangered	No
Green turtle	*Chelonia mydas*	Endangered	No
Atlantic Ridley turtle	*Lepidochelys kempi*	Endangered	No
Atlantic leatherback turtle	*Dermochelys coriacea*	Endangered	No
Eastern indigo snake	*Drymarchon corias couperi*	Threatened	Yes
Loggerhead turtle	*Caretta caretta*	Threatened	No
BIRDS			
Wood stork	*Mycteria americana*	Endangered	Yes
Everglades snail kite	*Rostrhamus sociabilis plumbeus*	Endangered	Yes
Red-cockaded woodpecker	*Picoides borealis*	Endangered	No
Cape Sable seaside sparrow	*Ammodramus maritima mirabilis*	Endangered	Yes
Bald eagle	*Haliaetus leucocephalus*	Threatened	Yes
Piping plover	*Charadrius melodus*	Threatened	No
Roseate term	*Sterna dougallii*	Threatened	No
MAMMALS			
Key Largo cotton mouse	*Peromyscus gossypinus allapaticola*	Endangered	No
Key Large woodrat	*Neotoma floridana smalli*	Endangered	No
West Indian manatee	*Trichechus manatus*	Endangered	No
Florida panther	*Felis concolor coryi*	Endangered	Yes
Mangrove fox squirrel	*Sciurus niger*	Candidate	Yes
PLANTS			
Garber's spurge	*Euphorbia garberi*	Threatened	No
INVERTEBRATES			
Stock Island tree snail	*Orthalicus reses*	Threatened	To be determined
Schaus swallowtail butterfly	*Papilio aristodemus ponceanus*	Endangered	No

Public Scoping for the Flamingo Potable Water Improvements

Environmental Assessment

Between May 16th –24th, 2002, scoping brochures for the Flamingo Potable Water and Wastewater Improvement Projects were mailed or emailed to approximately 600 individuals, organizations and agencies. The brochures were posted and distributed at the Flamingo developed area, park headquarters, and placed on the Everglades National Park website at http://www.nps.gov/ever/planning. A press release announcing the release of the brochures and inviting public participation in the planning process was emailed to South Florida media outlets on May 17th.

The brochures announced the intent to prepare environmental assessments to address alternatives for improving the drinking water and wastewater treatment systems at the Flamingo developed area. They described preliminary alternatives for each project, outlined preliminary resource considerations, and identified opportunities for the public to participate in the environmental assessment process. The brochures also requested that interested persons or organizations submit their views and/or concerns regarding these projects to the National Park Service.

Public scoping workshops on the drinking water and wastewater projects were held at the Flamingo Restaurant on May 29th and at the Florida City Hall on May 30, 2002. The goal was to solicit public input regarding the project alternatives and environmental issues to be addressed in the environmental assessments. Park staff were on-hand to listen to the public's views of the current systems, and to identify concerns, issues, and potential solutions for future management. Comments were received at the workshop, by mail, and via the Internet. A total of 14 comment letters/e-mails were received.

SUMMARY OF ISSUES AND CONCERNS ABOUT THE FLAMINGO POTABLE WATER SYSTEM IMPROVEMENTS PROJECT

The issues and concerns identified by the respondents fell into 4 broad categories: 1) NPS environmental leadership/sustainability issues, 2) comments on current management and preliminary alternatives, 3) construction effects, and 4) consultation/coordination

NPS ENVIRONMENTAL LEADERSHIP/SUSTAINABILITY ISSUES

- "Everglades National Park is not just a facility, it is a bellwether and should be a leader in all things environmental. We should take this opportunity to create a showcase of how to do it right and make that showcase available to the public." The reverse osmosis plant could be a visitor spot to explain its operations. (private individual)

- Park should be a leader in new environmental technologies, not a low cost follower. (private individuals, Flamingo resident)

CURRENT MANAGEMENT/CAPACITY ISSUES AND PRELIMINARY ALTERNATIVES

- "New water distribution system should have capability of servicing 100-150 campground spaces, IF the Park decides to implement concessioner operated campgrounds" (Park employee)

- "We have stayed at Flamingo Lodge at least once a year for many years and have experienced problems firsthand, including seeing notices about water contamination and once, a year or two ago, having no potable water or ice at all, except for bottled water. Clearly something needs to be done to rectify this situation…We would like to see additional information on Alternatives 2 and 3, including comparative costs before making input." (park visitor)

- Recommends Alternative 3, installation of a Reverse Osmosis System and new distribution lines. (concessioner)

- Water quality, continued leakage, and antiquated distribution system cause a strain on Flamingo visitors and residents (concessioner)

- Existing system is inadequate. (Flamingo resident, private individuals)

- Glad that Park is finally getting a chance to perform capital improvements. (private individual)

- Park has delayed action too long (private individual)

- Water and wastewater projects should be combined as a continuous system. "A way to improve the scoping would be to do a cradle to grave mass balance on the solids of both the potable water system and the wastewater system. Give us the whole story of how many pounds per year of what are removed, and where they eventually end up. It is not enough to say that the brine goes to a percolation pond. How much of which solids will percolate, where do they end up, and what do you do with the solids which do not percolate?" (private individual)

- "The two Flamingo projects are clearly connected and would BOTH be significantly affected by serious consideration of water conservation measures including re-circulation and re-processing facilities. Please include and develop another alternative in both EAs (or combine them). The new alternative(s) would be to maximize water conservation and re-use so as to reduce the need for water production (reduce the gallons needed) and reduce the need for wastewater treatment (reduce gallons treated). Such an alternative would follow NPS management policies calling for sustainable facilities, calling for the NPS to lead by example in management and facilities." (private individual)

CONSTRUCTION EFFECTS

- Archaeological surveys and testing will need to be conducted for areas that will experience ground disturbance. (NPS-Southeastern Archeological Center)

- Request that construction be done during the summer months to avoid visitor inconvenience. (private individual)

- Wants to know how Park will prevent damage to ecosystem during construction. Document should describe mitigation during construction. (U.S. Bureau of Indian Affairs)

- Notified Park that if the navigable channel into the Flamingo area will be impacted by construction, further consultation is needed (U.S. Coast Guard)

- Will Park exceed the current development footprint with proposed alternatives? (U.S. Fish and Wildlife Service)

CONSULTATION AND COORDINATION

- Has the park consulted with the Miccosukee and Seminole Indian Tribes? (U.S. Bureau of Indian Affairs)

- "This project has been determined to lie within the boundaries of the Biscayne Aquifer, which has been designated by EPA as a Sole Source Aquifer, i.e., it is the sole or principal water source for an area which, if contaminated, would create a significant hazard to public. For this reason, EPA is interested in reviewing this project." (U.S. Environmental Protection Agency)

- "We look forward to receiving the Draft Environmental Assessment document and coordinating with the National Park Service regarding historic resources that may be impacted by this project." (State Historic Preservation Officer, State of Florida)

Mailing List

I am interested in receiving future correspondence for this action. (Please circle) yes no

Note: If this form is not returned, your name will be removed from the mailing list for this project. (Please correct mailing label if in error)

If you wish to be added to the mailing list to receive periodic updates concerning the Flamingo Water System Improvements Environmental Assessment, please provide your mailing information below. The ease and speed of e-mail correspondence is preferred.

Name: Barry Kenney E-mail Address:

Address: Tropical Everglades Visitor Association

160 U.S. Highway #1

Florida City,FL 33034-5004

Thank you for your time and interest in Everglades National Park.

UNITED STATES POSTAGE PB 752109 MAY 28 02 MAILED FROM ZIP CODE 33030 POSTAGE REQUIRED

FIRST CLASS

National Park Service
Everglades National Park
Attn: Elsa M. Alvear
40001 State Road 9336
Homestead, FL 33034

FLAMINGO POTABLE WATER SYSTEM IMPROVEMENTS PUBLIC COMMENT FORM

Please use this form to record your comments regarding potential improvements to the Flamingo Potable Water System within Everglades National Park. These comments will be considered in developing design and management options and the Environmental Assessment for this project. **Please return this form by June 5, 2002.** Additional sheets may be attached if needed. Fold the form so the NPS address is showing and tape or staple the edges together to mail it.

General Comments: Please list any issues or concerns you wish to see addressed or information about the project you would like to provide:

The Flamingo water problem needs to be corrected now.We have del--ayed to many projects at Flamingo to long. I am not an expert on ~~water quality but our PARK needs a NEW SYSTEM. I Suggest that this~~ work MUST be undertaken in the summer months.We need not inconvience our vistors during PEAK time in the winter

I vote to Alternative#3

Alternatives: Internal NPS scoping meetings resulted in the development of preliminary alternatives that are described in the attached brochure. Do you have any comments on these alternatives? Are there other alternatives or strategies that should be considered?

#3 will be the best long term solution to this problem.And needs to be done in the summer months

DIVISIONS OF FLORIDA DEPARTMENT OF STATE
Office of the Secretary
Office of International Relations
Division of Elections
Division of Corporations
Division of Cultural Affairs
Division of Historical Resources
Division of Library and Information Services
Division of Licensing
Division of Administrative Services

MEMBER OF THE FLORIDA CABINET
State Board of Education
Trustees of the Internal Improvement Trust Fund
Administration Commission
Florida Land and Water Adjudicatory Commission
Siting Board
Division of Bond Finance
Department of Revenue
Department of Law Enforcement
Department of Highway Safety and Motor Vehicles
Department of Veterans' Affairs

FLORIDA DEPARTMENT OF STATE
Katherine Harris
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Ms. Maureen Finnerty
National Park Service
Everglades National Park
40001 State Road 9336
Homestead, Florida 33034

June 24, 2002

Re: DHR No. 2002-05181 / Reference No. D1815 / Date Received by DHR: May 28, 2002
Scoping for Environmental Assessments for Proposed Flamingo Potable Water System Improvements and Proposed Flamingo Wastewater System Improvements
Everglades National Park, Monroe County, Florida

Dear Ms. Finnerty:

Our office has received and reviewed the above referenced project in accordance with Section 106 of the *National Historic Preservation Act of 1966* (Public Law 89-665), as amended in 1992, and the *National Environmental Policy Act of 1969* (Public Law 91-190), as amended. The State Historic Preservation Officer is to advise and assist federal agencies when identifying historic properties listed, or eligible for listing, in the *National Register of Historic Places*, assessing effects upon them, and considering alternatives to avoid or minimize adverse effects.

We have reviewed the Scoping Letters for the proposed water system improvements referenced above, and note that the National Park Service is preparing a National Environmental Policy Act document. In this document, environmental considerations will include effects on historical and archaeological resources. We look forward to receiving the Draft Environmental Assessment document and coordinating with the National Park Service regarding historic resources that may be impacted by this project.

If you have any questions concerning our comments, please contact Mary Beth Fitts, Historic Sites Specialist, at mbfitts@mail.dos.state.fl.us or (850) 245-6333. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

Frederick P. Gaske, Deputy SHPO
for Janet Snyder Matthews, Ph.D., Director, and
State Historic Preservation Officer

RECEIVED
JUN 27 2002
BY:

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office (850) 245-6300 • FAX: 245-6435
☐ Archaeological Research (850) 245-6444 • FAX: 245-6436
☒ Historic Preservation (850) 245-6333 • FAX: 245-6437
☐ Historical Museums (850) 245-6400 • FAX: 245-6433
☐ Palm Beach Regional Office (561) 279-1475 • FAX: 279-1476
☐ St. Augustine Regional Office (904) 825-5045 • FAX: 825-5044
☐ Tampa Regional Office (813) 272-3843 • FAX: 272-2340

If you should have any further questions or comments, don't hesitate to either email me at hill.lois@epa.gov or call me at (404)562-9472.

Sincerely,

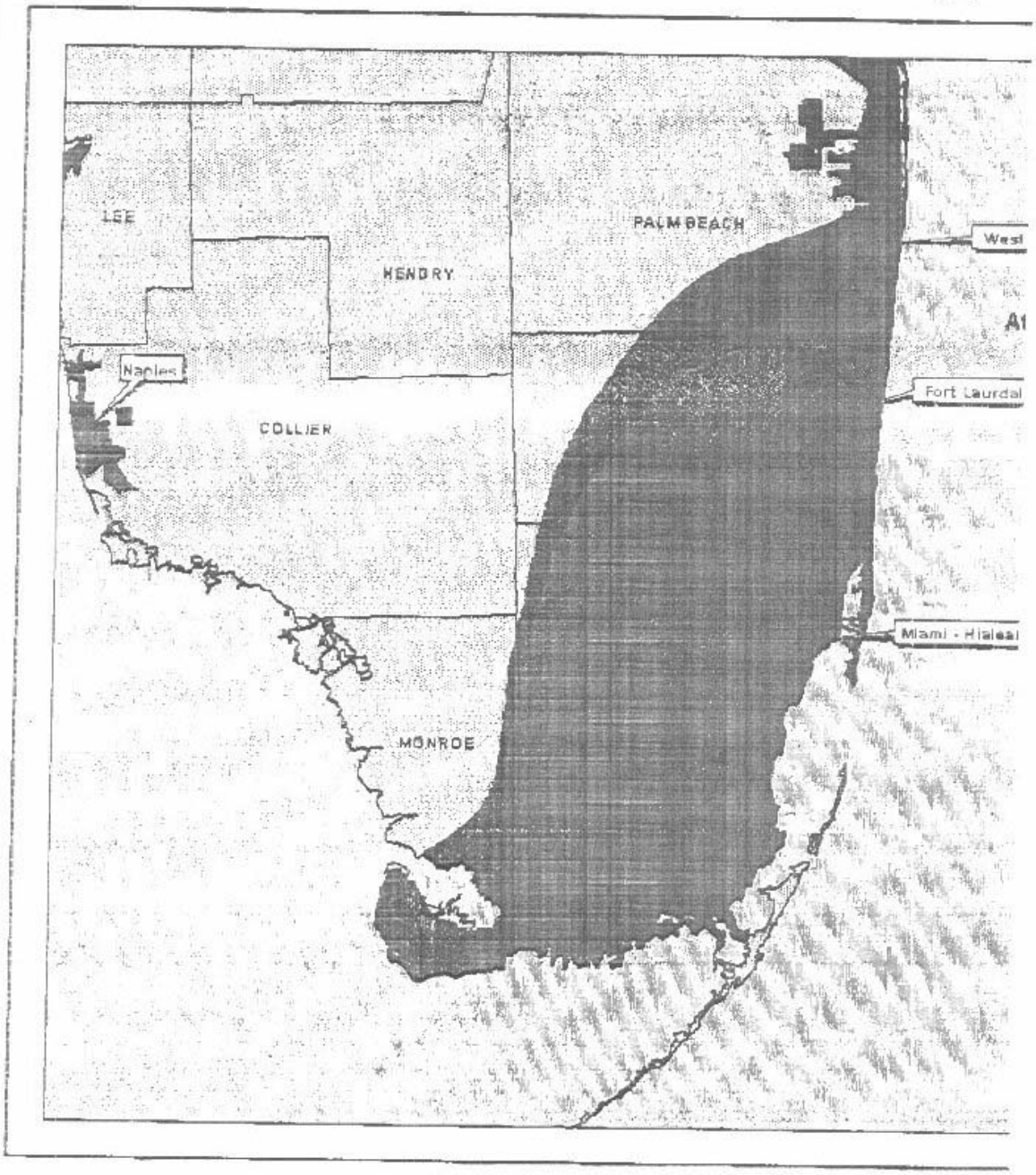
26

Lois E. Hill

Lois E. Hill, Environmental Engineer
Ground Water Drinking Water Branch
Sole Source Aquifer Coordinator

Enclosure

2c


LEE
HENDRY
PALM BEACH
West
A1
Naples
Fort Laurdal
COLLIER
Miami - Hialeal
MONROE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

June 11, 2002

Brien F. Culhane
Chief, Planning and Compliance
U.S. Department of the Interior
National Park Service
40001 State Road 9336
Homestead, FL 33034-6733

RECEIVED
JUN 17 2002
BY: Elsa Alvear

SUBJ: Advance Notification for Flamingo Water and Wastewater Services

Dear Mr. Culhane:

The Environmental Protection Agency (EPA) has received your request to review the above referenced proposed project and it has been reviewed pursuant to Section 1423(e) of the Safe Drinking Water Act. Regulatory groups within the EPA Region 4 Office responsible for administering other programs may, at their own discretion and under separate cover, provide additional comments.

This project has been determined to lie within the boundaries of the Biscayne Aquifer, which has been designated by EPA as a Sole Source Aquifer, i.e., it is the *sole or principal water source* for an area which, if contaminated, would create a significant hazard to public. For this reason, EPA is interested in reviewing this project.

After review of the information provided for this project, I conclude that necessary precautions to prevent contamination of the underlying aquifer will be taken. It is my understanding that plans for storm water, accidental hazardous spills, and best management practices for erosion control will be adhered to along with state and local permits.

With this letter, EPA recognizes that the Florida Department of Transportation, Inc. has met its obligation under Section 1424(e) of the Safe Drinking Water Act for this project. For your future use, I am enclosing a map of the aquifer.

Mailing List

I am interested in receiving future correspondence for this action. (Please circle) (yes) no

Note: If this form is not returned, your name will be removed from the mailing list for this project. (Please correct mailing label if in error)

If you wish to be added to the mailing list to receive periodic updates concerning the Flamingo Water System Improvements Environmental Assessment, please provide your mailing information below. The ease and speed of e-mail correspondence is preferred.

Name: Kurt Chandler

E-mail Address: not currently working

Address: ERO/BIA

711 Stewarts Ferry Pike

Nashville TN 37214

615 467-1677 Fax 615-469-2937

Thank you for your time and interest in Everglades National Park.

34¢
POSTAGE
REQUIRED

National Park Service
Everglades National Park
Attn: Elsa M. Alvear
40001 State Road 9336
Homestead, FL 33034

George S Smith

05/21/02 08:00 AM EDT

To: EVER Flamingo WW@NPS
cc: Maureen Finnerty/EVER/NPS@NPS, Rich Sussman/Atlanta/NPS@NPS, John Ehrenhard/SEAC/NPS@NPS, John Cornelison/SEAC/NPS@NPS
Subject: Flamingo Potable Water System Improvements

Flamingo Potable Water System Improvements, Environmental Assessment

The Southeast Archaeological Center has the following comments

General Comments:

Archeological survey and testing will need to be conducted in areas where ground disturbance will take place. Based on the results of that work, sites found will need to be evaluated. Mitigation to avoid or lessen the impact of the project on any significant resources will need to be developed. When the construction plans are available copies should be sent to SEAC as part of the XXX form for review. Budget for any archeological survey, testing, and mitigation should be built into the project.

Alternative 1. No Action: No archeology would be required.

Alternative 2: Improve Existing System: Archeological survey and testing would be required for the new 16 mile transmission line and new distribution lines.

Alternative 3: Reverse-Osmosis System, New Wells, and New Distribution System: Archeological survey and testing would be required for the two new well sites, short line from new wells to WTP, brine concentrate pipe to percolation pond, and the new distribution lines.

Dr. George S. Smith, RPA
Associate Director
Southeast Archeological Center
2035 East Paul Dirac Drive
Johnson Building, Suite 120
Tallahassee, FL 32310

850-580-3011 x127
850-580-2884 (fax)
George_S_Smith@nps.gov

William Fay
05/21/2002 02:07 PM EDT

To: Brien Culhane/EVER/NPS@NPS
cc: Michael Jester/EVER/NPS@NPS
Subject: Re: Your comments requested on Flamingo projects

Brien -
As we briefly discussed, my only concern is that the new water distribution system have the capibility of servicing 100 - 150 campground spaces, IF the park decides to implement concessioner operated campgrounds as part of the Flamingo Prospectus.
Cordially, Bill

Brien Culhane

Brien Culhane
05/20/02 02:41 PM EDT

To: EVER All Employees, DRTO All Employees
cc:
Subject: Your comments requested on Flamingo projects

Dear Park Employees:

The National Park Service (NPS) has begun planning to upgrade the potable water and wastewater treatment systems for the Flamingo developed area within Everglades National Park. The goal of these projects is to provide safe, reliable drinking water and wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for each project. Brochures describing these projects are attached below for your information.

Information gathering for these projects is just beginning and we would like to invite your participation in helping to develop the best projects possible. We would appreciate your careful review of the brochures and ask that you provide us with comments by **June 5, 2002**. You can respond by email at **EVER_Flamingo_WW@nps.gov**, or by using the comment form included in each brochure.

In addition, two public scoping workshops will be held:

May 29, 2002
Flamingo Restaurant
Everglades National Park
5:00 – 8:00 P.M.

May 30, 2002
Florida City Council Chambers
404 West Palm Drive, Florida City
5:00 – 8:00 P.M.

Park staff and the public are welcome to attend at any time during the informal workshops. The format will include a display on each project with park staff available to answer questions and take comments. No presentations are planned. The purpose of the workshops is to identify issues and concerns in order to define the scope of analysis for the environmental assessments.

As soon as the draft environmental assessments are completed, the documents will be released to the public to review for a period of 30 days, during which time another public workshop will be scheduled. We will also post them on our website at **http://www.nps.gov/ever/planning**.

Written comments on the draft EAs will be accepted during the 30-day review period.

We look forward to your participation in the planning process. Should you have any questions about the Flamingo projects or the workshops, please contact Elsa Alvear, Environmental Protection Specialist, by calling 305-242-7703, or by email at Elsa_Alvear@nps.gov.

Thank you for your time and interest in these important projects.

Sincerely,

Brien Culhane


Flamingo_potable_water.p


Flamingo Wastewater.pd

Brien Culhane, AICP
Chief, Planning and Compliance
Everglades and Dry Tortugas National Parks
(305) 242-7717
brien_culhane@nps.gov

FLAMINGO LODGE
Marina & Outpost Resort
IN EVERGLADES NATIONAL PARK
Operated by Amrac *Parks & Resorts*

May 23, 2002

Else Alvear, Environmental Specialist
National Park Service
Everglades National Park
4001 State Road 9336
Homestead, FL 33034

Ms. Alvear:

As the authorized concessionaire for the visitor services at Flamingo Lodge & Marina we appreciate the opportunity to provide comments on the alternatives for improving water quality and distribution to the Flamingo area of Everglades National Park.

In our opinion, Alternative 2 will not improve the situations continually experienced down here. Alternative 1 would continue with no changes. Consequently, we agree and suggest the proposals indicated in Alternative 3.

The water quality, continued leakage, and antiquated distribution system are a strain on all visitors and residents of the Flamingo area. Continued efforts to improve leaks, posting of water quality notices, and boil water orders do not provide for a positive experience to the area.

As the Flamingo Concessionaire we look forward to the possibility of implementation on Alternative 3. In addition, we will be happy to assist in any way possible with any of the alternatives decided upon.

If you have any additional questions or comments, please feel free to contact me.

Sincerely,

Peter Hulse
General Manager

#1 Flamingo Lodge Hwy., Flamingo, Florida 33034 • www.flamingolodge.com
(941) 695-3101 • Fax: (941) 695-3921

"Margaret Anderson" <anderson@beattynv.com>

To: <EVER_Flamingo_WW@nps.gov>
cc:
Subject: EA Comment

06/05/02 10:50 PM MST

Dear Sir or Madam,

The 2 Flamingo projects are clearly connected and would BOTH be significantly affected by serious consideration of water conservation measures including re-circulation and re-processing facilities. Please include and develop another alternative in both EAs (or combine them). The new alternative(s) would be to maximize water conservation and re-use so as to reduce the need for water production (reduce the gallons needed) and reduce the need for waste water treatment (reduce the gallons treated). Such an alternative would follow the NPS management policies calling for sustainable facilities, and calling for the NPS to lead by example in its management and facilities.

Sincerely,

Richard Anderson
P.O. Box 10
Beatty, NV 89003-0010

anderson@beattynv.com

ScottJStoner@aol.com

06/06/02 07:59 PM EDT

To: EVER_Flamingo_WW@nps.gov
cc:
Subject: comments on scoping documents and request to be on mailing list

I apologize for being a day late in submitting this but just came across it today on the park's website. We are interested in being on the mailing list for future notifications of opportunities to comment about options for both the Flamingo drinking water treatment and waste water treatment.

Regarding drinking water supply: We have stayed at Flamingo lodge at least once a year for many years and have experienced problems firsthand, including seeing notices about water contamination and once, a year or two ago, having no potable water or ice at all, except for bottled water. Clearly, something needs to be done to rectify this situation; the "no action" Alternative 1 is NOT a viable option. At this point, we have no opinion at this time between Alternatives 2 and 3; we would like to see additional information on these two options including comparative costs before making input.

Regarding the Flamingo waste water treatment plant (WWTP). The no-action alternative is not a good option; we favor construction of a new plant that will meet all state requirements. We would want any new plant to continue to discharge into Eco Pond (as the scoping document promises), as that is one of the best birding sites in all of south Florida.

Please place us on the mailing list for future opportunities to comment as these plans are developed.

Scott and Denise Stoner
6 Knob Hill Road
Loudonville, NY 12211-1112

Preferred contact: email: Scottjstoner@aol.com

"Sarah Beckwith"
<sarahphoeni@earthlink.net>

To: <EVER_Flamingo_WW@nps.gov>
cc:
Subject: Comments to Flamingo water system improvements

06/06/02 11:09 AM AST

June 6, 2002

As a resident of Flamingo, FL, I feel that I must comment on the upgrade of the Flamingo water system. I agree that the existing drinking water and wastewater systems at Flamingo are inadequate (I have spent many a day at home or work with no water), and that it is time to improve these processes. I would hope that Everglades National Park would do this in the most environmentally sound way possible.

My greatest concern is that these improvements will only meet the minimum standards for phosphorous content. Just thirty miles away, much higher standards will be in effect (Pine Island). I can't understand why a completely connected and interdependent ecosystem would be divided and addressed differently? Is one part of the Everglades more environmentally sensitive than another? Why would the national park not do its best to protect and preserve the ecosystem in the most pristine state possible? I believe it's because we can get away with much less. If this will be the case, then shame on us. Everglades National Park, of all parks, should be trying to do the right thing. We are holding ourselves up to the world as an example of large-scale restoration efforts. But what about the less glamorous aspects of restoration?

People visit Everglades National Park from all over the world, and many are visiting because of the birds in particular. Eco Pond has become a birding hotspot. Many species of birds nest, roost, and feed in Eco Pond and the surrounding vegetation. Yes, it is a percolation pond, but it is obviously much more. We should be providing the wildlife that has come to depend on the waters of Eco Pond with the cleanest water possible, cleaner than the minimum standards. Eco Pond, because of its visitation, can also be a showcase to the world of the environmentally sound choices the NPS can make. Signs and literature describing the wastewater process could educate visitors. We want the American people to get behind the NPS mission, and this would be a perfect way to do that.

Everglades National Park can show millions that they chose to do more than they had to do; that they are providing cleaner water than they had to provide; that they are environmental leaders, not followers always trying to catch-up and do just enough to get by. This would be not only good for the ecosystem, but good for the image of the National Park Service. And it would be something to be proud of.

Sarah Beckwith
Flamingo, FL

RistCK@aol.com

05/23/02 07:29 PM EDT

To: EVER_Flamingo_WW@nps.gov
cc:
Subject: Potable water and Wastewater system scoping documents

Dear Brien:

I have carefully reviewed the scoping notices for the environmental assessment of the Park's potable water system improvements and its wastewater system improvements. Both of these documents cover all of the issues I am familiar with. I
have no additional input. I am glad to see that the park finally is getting a chance to start catching up with its needs for capital improvements.

Sincerely,

Karsten Rist

William B. Brown
<bill.brown.tu78@alum
.dartmouth.org>

To: EVER_Flamingo_WW@nps.gov
cc:
Subject: Public Comments on Flamingo Water and Wastewater

05/21/02 09:56 AM AST

Dear Sirs:

Very nice scoping notice.

A couple of points to make. ENP is not just a facility, it is a bellweather and should be the leader in all things environmental. By that I mean to say that we should take this opportunity to create a showcase of how to really do it right and make that showcase available to the public. Along these line, please consider the following:

1- make the RO plant a visitor spot to explain how it works, and help explore the issues.
2- integrate the wastewater system into the plans and use that for irrigation and toilets at the motel and campgrounds.
3- consider other possibilities for toilets, composting, etc.

Let's not do business as usual, let's really make ENP the showcase for advanced technologies that will be implemented over the coming years in South Florida and other places who must husband their water. I realize that what I am proposing will cost more money, much more money, however, maybe we can explore ways that private manufacturers can participate in showing their technologies and donate some of the costs.

Separately, a way to improve the Scoping would be to do a cradle to grave mass balance on the solids of both the potable water system and the wastewater system. Give us the whole story of how many pounds per year of what are removed, and where to they eventually end up. It is not enough to say that the brine goes to a percolation pond. How much of which solids will percolate, where do they end up, and what do you do with the solids which do not percolate? I think that the environmental community and other interested parties now realize that you have to do a complete life cycle accounting to prevent unintended consequences.

Let's be leaders in new environmental technologies, not low cost followers! ENP is run as as showcase, not a cost efficient tourist attraction.

Bill Brown
South Florida Operations Manager
ICF Consulting

Palm Beach Gardens, FL
561-683-4116
561-307-3807-cell
561-630-6729-fax
Note: Please discontinue use of usna71@flinet.com and
use bill.brown@1971.usna.com
backup is
bill.brown.tu78@alum.dartmouth.org

"O'Connell, Francis LT"
<FO'Connell@D7.USCG.Mil>

06/03/02 11:22 AM AST

To: "'Elsa_Alvear@nps.gov'" <Elsa_Alvear@nps.gov>
cc: "Embres, Joseph" <JEmbres@d7.uscg.mil>, "Jaeger, Larry CAPT" <LJaeger@D7.USCG.Mil>
Subject: Flamingo Wastewater System Improvements

Ms. Alvear,

Good morning. I'm writing on behalf of the Coast Guard Seventh District Aids to Navigation and Waterways Management Office in response to your letter dated May 28. Based on the information provided, we have no immediate objection to the proposed upgrade to the potable water and wastewater treatment systems for the developed Flamingo area in Everglades National Park. However, we are unsure what the scope of the proposed work will be and if the upgrade will impact the navigable channel which runs into the Flamingo area. If the proposed work will involve a modification to or closing down of the channel for any reason, it is imperative that a detailed work proposal be sent to our office for our approval. Our interest in a project which may affect the aids to navigation system is two-fold: (1) to ensure that the waterway will be usable (so far as practicable) to the mariner; and (2) ensure that the mariner is notified in a timely manner if any changes or modifications will be made to the waterway.

Thank you for your time and consideration in this matter. Please call me if you have questions or concerns.

Sincerely,

LT Francis O'Connell
Seventh District (oan)
(305) 415-6737

FLAMINGO POTABLE WATER SYSTEM IMPROVEMENTS PUBLIC COMMENT FORM

Please use this form to record your comments regarding potential improvements to the Flamingo Potable Water System within Everglades National Park. These comments will be considered in developing design and management options and the Environmental Assessment for this project. **Please return this form by June 5, 2002.** Additional sheets may be attached if needed. Fold the form so the NPS address is showing and tape or staple the edges together to mail it.

General Comments: Please list any issues or concerns you wish to see addressed or information about the project you would like to provide:

Describe how you will prevent Ecosystem damage during construction.

Have you consulted Miccosukee & Seminole tribes yet?

Alternatives: Internal NPS scoping meetings resulted in the development of preliminary alternatives that are described in the attached brochure. Do you have any comments on these alternatives? Are there other alternatives or strategies that should be considered?

Describe New water source to pond if present water cut off

Describe Mitigation during construction

APPENDIX C- PHOTOGRAPHS OF THE PROJECT AREA

Flamingo wells, access road and surrounding area

Flamingo wells, pumps and chlorination facility

Water treatment plant and 250,000 gallon storage tank.

Wastewater treatment plant and percolation pond (brine concentrate would be transferred here)

APPENDIX D- LIST OF RECIPIENTS THAT RECEIVED PUBLIC SCOPING BROCHURE

Mailing List for Flamingo Water and Wastewater EA Scoping Brochures

***** Denotes a Member of the South Florida Ecosystem Restoration Working Group

Florida Congressional Delegation
U.S. Senate, Hon. Bob Graham
U.S. Senate, Hon. Bill Nelson
U.S. House of Representatives, Hon. Peter Deutsch

Federal Agencies
Advisory Council on Historic Preservation – Mr. Don Klima
U.S. Army Corps of Engineers, Jacksonville District Engineer – Col. James May*
U.S. Army Corps of Engineers, Regulatory Branch, Miami
U.S. Coast Guard – Commander (oan) Seventh Coast Guard District
U.S. Department of Agriculture-Natural Resources Conservation Service – Mr. Ron Smola, *
Mr. Thaddeus Hamilton*
U.S. Department of Commerce-
National Marine Fisheries Service-Southeast Fisheries Science Center
Mr. Brad Brown, Director*
Ms. Neysa Foy Gabriel
NOAA-Florida Keys National Marine Sanctuary – Superintendent Billy D. Causey*
NOAA/Atlantic Oceanographic and Meteorological Laboratory – Mr. Peter Ortner*
U.S. Department of the Interior
Bureau of Indian Affairs – Eastern Office, Mr. Kurt Chandler*
Fish and Wildlife Service – South Florida Field Office Supervisor, Mr. Jay Slack*
Geological Survey- Biological Resources Division- Mr. G. Ronnie Best*
National Park Service **(by e-mail)**
Associate Director, Natural Resources – Mr. Mike Soukup
Water Resources Division – Mr. Dan Kimball
Associate Director, Park Operations – Mr. Dick Ring
Big Cypress National Preserve, Superintendent, Mr. John Donahue
Biscayne National Park, Superintendent Ms. Linda Canzanelli
Everglades National Park employees (300 people)
Southeastern Archeological Center, Director -John Ehrenhard
Southeast Regional Office, Division Planning and Compliance –
Mr. Rich Sussman, Ms. Jami Hammond
South Florida Ecosystem Restoration Task Force – Exec. Director Terrence "Rock" Salt
U.S. Department of Justice – U.S. Attorney's Office, Ms. Barbara Junge*
U.S. Department of Transportation – Federal Highways Administration, Mr. George Hadley*
U.S. Environmental Protection Agency
Groundwater Technology & Management Section – Atlanta GA
South Florida Field Office, Director Richard Harvey*
Federal Emergency Management Agency – Natural Hazards Branch Chief- Atlanta

Native American Tribes
Miccosukee Tribe of Indians of Florida
Chairman Billy Cypress
Water Resources Manager, Mr. Truman E. Duncan*
Mr. Terry Rice*
Seminole Tribe of Florida
Acting Chairman Mitchell Cypress

Water Resources Director, Mr. Craig Tepper*

State of Florida

Office of the Governor, Senior Government Analyst – Mr. Rick Smith*
Florida Department of Agriculture & Consumer Services – Director, Mr. Chuck Aller*
Florida Department of Community Affairs
Community Program Administrator – Mr. Ken Metcalf*
Florida Department of Environmental Protection
District Manager, Fort Myers Office – Mr. Richard W. Cantrell
Director, Ecosystem Planning and Coordination, Mr. Ernest Barnette* - Tallahassee
Florida Department of Transportation
District Six Environmental Administrator, Ms. Marjorie Bixby*
Florida Fish and Wildlife Conservation Commission,
Mr. Allan Egbert – Tallahassee
Office of Environmental Services, Mr. Joseph T. Walsh*
Florida Department of State-Division of Historical Resources
State Historic Preservation Officer- Ms. Janet Snyder Matthews
Florida Senate, District 40 – Hon. Daryl L. Jones
Florida House of Representatives, District –112- Hon. Mario Diaz Balart
Florida House of Representatives, District 120 – Hon. Ken Sorenson
South Florida Water Management District-
Executive Director - Mr. Henry Dean*
Senior Policy Advisor - Ms. Kathy Copeland*
Lead Planner, Water Resources Advisory Commission - Mr. Julio Fanjul

Regional

South Florida Regional Planning Council, Executive Director

County Government
Broward County Department of Natural Resources, Director Steve Sommerville*
Broward County Department of Environmental Protection, Ms. Patti Webster
Miami-Dade County Commission, District 8 Ms.Katy Sorenson
Miami-Dade County Commission, District 9, Mr. Dennis Moss
Miami-Dade County Department of Environmental Resources Management, Director, Mr. John Renfrow
Miami-Dade County Water and Sewer Department, Mr. Roman Wenglowsky
Monroe County Commission, District 5, Mr. Murray Nelson
Monroe County Commission, District 4, Ms. Nora Williams
Monroe County Commission, District 3, Mr. Charles McCoy
Monroe County Commission, District 2, Mr. George Nugent
Monroe County Commission, District 1, Ms. Dixie Spehar
Monroe County Public Works Division – Director, Mr. Dent Pierce
Monroe County Environmental Resources Department – Director, Ms. Marlene Conaway
Monroe County Marine Resources Department – Director, Mr. George Garrett
Palm Beach County Water Utilities Department – Mr. Fred Rapach*

Local Government
City of Homestead, Mayor Roscoe Warren
City of Florida City, Mayor Otis Wallace

Environmental Organizations
Audubon Society of the Everglades- Ms. Rosa Durando
Audubon Society of Florida, CEO Stuart Strahl
Biscayne Bay Foundation, Mr. Edwin Moure
Broward County Sierra Club, Mr. Rod Tirrell
The Conservancy of Southwest Florida – Ms. Kathy Prosser
Citizens for a Better South Florida – Ms. Audrey Ordenes
Clean Water Action – Ms. Kathy Aterno
Earthwise Productions – Audrey and Frank Peterman
Earthjustice Legal Defense Fund – Mr. David Guest
Environmental Defense Fund - Mr. Tim Searchinger,
Everglades Coalition Co-Chair – Ms. Shannon Estenoz
Everglades Coordinating Council – Ms. Barbara Jean Powell
Florida Audubon Society – Mr. Charles Lee
Florida Defenders of the Environment – Ms. Susan Uhl Wilson
Florida Wildlife Federation – Mr. Manley Fuller
Friends of the Everglades – Executive Director
Izaak Walton League, Mr. Michael Chenoweth, Ms. Juanita Green
Ocean Conservancy – Florida Keys Office, Mr. David Holtz , Ms. Nancy Klingener
Sierra Club Fla. – Mr. Craig Diamond
Sierra Club- St. Petersburg – Frank Jackalone
Sierra Club Miami Group, Mr. Alan Farago, Ms. Barbara Lange
National Parks Conservation Association – Ms. Mary Munson
Natural Resources Defense Council – Ms. Sarah Chasis
National Wildlife Federation- Mr. Kris Thoemkke
Redlands Conservancy, Mr. Karsten Rist
Tropical Audubon Society – Executive Director, Mr. Don Chinquina
The Wilderness Society – Mr. Jim Waltman
Word Wildlife Fund Florida Keys Office, Ms. Debbie Harrison
1000 Friends of Florida – Mr. Terrell Arline

Companies
Flamingo Lodge Marina and Outpost Resort, General Manager, Mr. Peter Hulse
Flamingo Lodge Marina and Outpost Resort, employees (37 people)
AMFAC Parks and Resorts, VP Mr. Steve Tedder, and President, Andy Todd
Outward Bound, Ms. Sarah Zeller

Other
South Florida Ecosystem Restoration Task Force, List Server of Interested Parties (**250 people by e-mail**)
Southeast Environmental Research Center, FIU, Mr. Ron Jones, Director*
University of Miami, RSMAS, Dr. Daniel Suman
Homestead/Florida City, Chamber of Commerce, Ms. Mary Finlan
Marathon Chamber of Commerce, Executive Director Ray Kitchener
Tropical Everglades Visitors Association, Executive Director Barry Kenney
Lee County Smart Growth, Mr. Wayne E. Daltry*
Mr. Dennis Sytsma
Mr. Steve Sapp, Sapp Farms, Homestead

APPENDIX E- VALUE ANALYSIS

PROJECT REVIEW REPORT

Date: 7/10/00

United States Department of the Interior / National Park Service / Construction Project Review Process

PARK: EVER **PKG. #:** 191 **REGION:** Southeast

PROJECT TITLE: FLAMINGO WATER SYSTEM IMPROVEMENTS

RESPONSIBLE OFFICE: *DSC*

SCHEDULED FY: 1998 **FUNDING TYPE:** Line-Item Construction (Budget Request)

PROJECT PURPOSE Provide a sufficient quantity of potable water to Park employees, visitors, and concession operations in the Flamingo area to meet current and projected needs.

Problem Discussion:

Current water quantity and pressures are below design criteria for the newly designed Nanofiltration Water Treatment Facility, which is currently under construction. This is resulting from the increasing deterioration of the water line supplying raw water to the developed area. Repair or replacement of the line is not part of this package.

The existing 6-inch asbestos-cement raw water transmission mainline, which conveys raw water from the wells approximately 16 miles to the water treatment facility, is over 44 years old and in a fragile and deteriorating state. The existing transmission mainline has developed a number of leaks due to age and is experiencing bacterial growth within the pipeline itself. The bacterial growth within the pipeline is primarily caused by organic material in the raw water itself. It clogs the lines thereby increasing water pressure and leaks. The extent of the bacterial growth and line restriction was not found in the original design investigation. It was identified after the temporary water plant cartridge filters were clogging at an accelerated rate.

An independent contractor conducted a leak detection investigation in 1995. The test results indicated that over the 16-mile length of the raw water main, the leakage rate is approximately 3,500 gpd/mile of main for a 24-hour operation day (approximately 56,000 gpd). As a point of comparison, leakage at a rate of 3,000 gpd/mile of main is considered acceptable loss in a typical water distribution system. "Acceptable loss" is defined as a water loss that would cost more to locate and repair than to allow the loss to continue. It should be emphasized that this study was performed five years ago, and it is suspected that the current leakage rate is up to approximately 8,000 gpd/mile (approximately 128,000 gpd). An additional consideration is that each mile of the raw water pipeline contains over 250 joints of pipe. Due to the nature of the soils and the high groundwater, locating individual leaks is virtually impossible, unless it is a significant leak with substantial water loss. Typical design and service life of a pipeline ranges from approximately 30 to 50 years. Under current operating conditions, the expected service life of the raw water main would be another 5 to 6 years.

Under current conditions, the wells, pumps, and transmission line are delivering between 106,000 and 170,000 gpd.

It should also be stated that the distribution lines that deliver potable water to the developed area are 40 plus years old and experiencing significant losses (the lines are poorly metered and loss quantities are unknown by high). This will continue to effectively increase demand for finished water until the distribution system is replaced.

The original design criteria for the nanofiltration plant indicates a maximum (peak) daily demand of 160,000 gpd, with an average daily demand of 90,000 gpd. In order to provide the Flamingo area with a

peak daily demand of 160,000 gallons of potable water, the plant would have to receive 213,000 gpd. In order to provide the average daily demand of 90,000 gpd, the plant would have to receive 120,000 gpd. Due to the amount of leakage in raw water main line and the restriction caused by the bacterial growth, the new well pumps are not capable of producing at the peak daily demand.

Water meter readings show that peak demands are intermittent and most often occur on weekends. Peak readings are typically around 125,000 gpd. Attached is a peak season water production/demand spreadsheet showing projected usage figures for the month of December 1999, and actual meter readings for the time period January through March 2000.The current design includes a new 246,000 finished water storage tank. The analysis shows that the storage capacity in the storage tank is more than adequate to provide enough potable water to serve the area during high demand (typically weekends), and recover (or fill itself) during lower demand (this assumes pumping 24 hours a day during a portion of the peak season). Therefore, during the short term, until funding is available to implement Alternative #4 (Convert to R.O.), the system should be able to provide sufficient water to meet the average daily demand. However, the condition of the existing system including the distribution system will continue to worsen, making it imperative to establish a consistent water source capable of meeting the average peak daily demand of 160,000 gpd. Line breaks will continue to require an 8-hour day to detect and repair. This will take the system out of service. It is expected that the frequency of line breaks will increase.

[If applicable, include a description of measures taken to justify the need for employee housing and the type of housing unit(s)]

PROJECT PROPOSAL

Project Description: Rehabilitate Flamingo Water Transmission, Treatment, and Distribution System.

The recommended project proposal includes drilling new wells in the Flamingo Area, replacing the nanofiltration unit with a Reverse Osmosis unit, and replacement of failing components of the potable water distribution system serving the Flamingo area. The existing potable water distribution system is also in a deteriorating and fragile state, with the Park performing continual repairs of leaks and breaks. Replacement of failing components of the potable water distribution system will improve overall Park operations, reduce water demand, and help to ensure the reliability of the water provided for the Flamingo Area.

[Describe original project scope from approved 10-238C or PMIS form]

Class C Cost Estimate: $ 1,130,800 Estimate in 2001 Dollars

[Provide original Class C estimate (based on unit costs of comparable construction) from approved 10-238C or PMIS 802 form]

SCHEMATIC DESIGN

Alternatives Considered with Cost Estimates:

Alternative #1: No Action (Not Feasible)
- Initial Cost = $0.00 plus unknown repair cost on finding leaks.
- Total Life Cycle Cost = $1,583,136 plus unknown repair costs

Alternative #1a: Rehabilitate and Maintain Existing Line - (Short-term fix)
Add pigging ports and clean line through "pigging" on a regular basis
Find and repair breaks and leaks in line
Remove unused gate valves and tees
Replace ~700 linear feet of branch pipe to West Lake
Construct 200,000-gallon raw water storage tank for backup supply
- Initial Cost = $525,500.00 (includes 10% contingency)
- Total Life Cycle Cost = $2,108,636

Alternative #2: Replace Water Line
New piping for main line
Temporary raw water storage tank for backup
Locate and repair major leaks as a temporary measure and as part of construction
- Initial Cost = $2,846,250 (includes 10% contingency)
- Total Life Cycle Cost = $3,794,890

Alternative #3: Slip Line Existing Water Line
New slip-lined pipe
Temporary raw water storage tank
Repair major breaks in existing main line
Clean existing line through pigging
Remove non-functional in-line gate valves
Replace branch line to West Lake
Replace additional plant filters due to extra clogging
- Initial Cost = $2,011,900 (includes 10% contingency)
- Total Life Cycle Cost = $3,077,075

Alternative #4: Drill New Wells/ Convert to Reverse Osmosis (R.O.) Treatment System
Drill new wells (two at Flamingo plant area and one at West Lake)
Test water - chemical analysis
Modify plant design for RO operation - replace nanofiltration unit with RO
Install small RO unit and leach field for West Lake
- Initial Cost = $1,130,800 (plus loss of $200,000 nanofiltration unit, includes 10% contingency)
- Total Life Cycle Cost = $2,588,462

Alternative #4a: Provide Alternative #4 concurrent with existing construction contract.
Savings would be labor and materials to install and remove nanofiltration unit - no savings on unit itself
Complete unit online sooner
Potential for higher cost to Government (~$500,000 loss)
Compliance, permitting, design, and funding elements not conducive to meeting current construction completion schedule

[Describe alternatives considered, label the required 90% & 75% alternatives, & show Class C estimates for each alternative]

Preferred Alternative & Rationale for Selection:

Alternative #4: Drill New Wells/ Convert to Reverse Osmosis (R.O.) Treatment System
Benefits/Rationale for Selection:
- Life Cycle Cost Analysis reflects the best cost per advantage ratio
- Eliminate 18-miles of transmission mainline and associated maintenance/operation difficulties
- Very low probability for service loss
- Low maintenance effort
- Easy access to wells
- R.O. system could be installed within the treatment plant currently under construction
- Disposal lagoon for discharge is already in place
- Relatively low impact on environment/resources
- Wells would be located in Flamingo and connected to the emergency generator and automatic transfer switch. Drinking water could be produced during power outages, without interruption.

The Value Analysis (VA) Team did not pursue Alternative #4a due to the greater risk to the Government and higher cost for minimal return in value. The recommendation of the VA Team is that the nanofiltration system currently under contract be modified to operate at less than peak daily demand, but within 90% of the average daily demand under worst case conditions, for the short term. Alternative #4 should be implemented as soon as possible given the current state of the transmission and distribution lines.

The Value Analysis Team recommends the following short-term solutions to the inadequate water supply situation: Utilize the existing 120,000 gallon standpipe for raw water storage to circumvent the build up in line pressure due to filter restriction, implementation of water conservation measures, and possibly hauling in water during peak demand times. The actual working storage volume of the standpipe is approximately 30,000 gallons. By using this volume within the standpipe as a type of "break tank", the pressure in the transmission line would be significantly reduced, thus reducing the amount of water loss due to pipeline leaks and breaks. In addition, implementation of water conservation measures during peak usage periods, in conjunction with the availability of the newly constructed 246,000 gallon finished water storage tank to provide additional potable water storage, will help to decrease the demand placed on the system, and provide system flexibility in supplying potable water to the Flamingo developed area.

Class B Cost Estimate (Net): $ 1,130,800 Estimate in 2001 Dollars

Class B estimate reflects a 10% contingency due to uncertainties in the RO unit required for this project. Additional testing, including test wells, water sampling, and water analysis, is required for a more accurate estimate.

[Provide a Class B estimate (based on design quantities) for the preferred alternative]

ANALYSIS

Changes in the Current Project Scope Compared to the Original Proposal: Current project scope is within original proposal, however, outside of the scope for the current construction contract.

Changes to the Anticipated Advantages for the CBA Factors in the Original Proposal: N/A

Changes in the Current Project Scope Compared to the Budget Request (Green Book): N/A

Results of Value Analyses: Alternative #4: Drill new wells and convert to RO system appears to be the most favorable solution to the problem.

[Provide an electronic file of any value analysis reports or value engineering studies to the WASO Construction Management mailbox or send a paper copy to WASO Construction Management, 12795 West Alameda Parkway, Lakewood, Colorado 80228]

Reasons for Not Accepting Any Value Analysis Recommendations that Would Increase Project Benefits or Reduce Costs: N/A

Square-Footage, Linear-Footage, or Other Unit Costs for Project & Comparable Facilities:

Linear feet of piping:

$30 LF of 6 inch PVC pipe

$25 LF of 4-inch PVC Pipe

[Describe the unit costs of this project & similar facilities constructed recently by other federal, state, or local agencies; private sector organizations; or, if other comparable facility costs are not available, by the NPS]

SCHEDULE & FUNDING SUMMARY: PMIS request made for FY 2001

[Show schedule & funding for current work, previous &/or future phases, & contributions of each party for partnerships]

PREPARED BY: Daniel J. Cloud, Civil Engineer, DSC-PDS, (303) 969-2696
for John Hoesterey, Project Manager, DSC, (303) 987-6721

[List name, title, organization, and telephone number]

ATTACHMENTS: Life Cycle Cost Analysis, Choosing by Advantages Worksheet, Construction Cost Estimates for Alternatives, and Demand/Supply Spreadsheet

EVERGLADES NATIONAL PARK – FLAMINGO WATER SYSTEMS IMPROVEMENTS

Choosing by Advantages

COMPONENT;					FUNCTION:		
FACTOR	ALTERNATIVES						
	Alternative 1 • TOTAL REPLACE		Alternative 2 • SLIP LINE		Alternative 3 • CONVERT TO RO		Alternative ____ •
PROVIDE FOR VISITOR ENJOYMENT							
FACTOR 1 – Reliability – continual supply							
Attributes	• Brand new • Low potential for catastrophic failure • Takes care of existing issues		• Depends on integrity of existing line • Moderate potential for catastrophic failure		• Eliminates 16 miles of pipe • Very low potential for service loss		•
Advantages	**Better Supply Reliability**	**90**	*Least Preferred Set of Attributes*		**Best Supply Reliability**	**100**	
PROVIDE COST-EFFECTIVE, ENVIRONMENTALLY RESPONSIBLE, AND OTHERWISE BENEFICIAL DEVELOPKENT FOR THE NPS							•
FACTOR 2 – Fundability – contingency, line item, DAB, What the park can afford annually							
Attributes	• DAB – LI • 2-5 Years		• DAB – LI • 2-5 Years		• Fee Demo • DAB – LI • 1-5 Years		
Advantages	*Least Preferred Set of Attributes*		**Poor Fundability**	**40**	**Better Fundability**	**90**	
							•
FACTOR 3 – Impacts on Construction Contract							

Attributes	• Minimal to none		• Minimal to none		• Minimal to none • Lose nanofiltration		
Advantages	SAME		SAME		SAME		•
FACTOR 4 – Timeliness – the State, What will they allow?							
Attributes	• w/ current plant online We're OK – residents OK		• w/ current plant online We're OK – residents OK		• w/ current plant online We're OK – residents OK		
Advantages	SAME		SAME		SAME		
							•
IMPROVE EFFICIENCY OF PARK OPERATIONS							
FACTOR 5 – Maintainability and Sustainability – Operations complexity, operator skill							
Attributes	• Low – moderate maintenance • Need provided • Pigging required • Wells 16 miles away		• Moderate maintenance • Higher risk for line failure than total replacement • Wells 16 miles away		• Low maintenance effort – eliminate line • Operator still same as for nanofiltration plant • Easy access to wells		
Advantages	Better	50	*Least Preferred Set of Attributes*		Best	85	•
PROTECT CULTURAL AND NATURAL RESOURCES							
FACTOR 6 – Resource Impact-Compliance							
Attributes	• Line close to wetland – short term construction impacts		• Very low construction impacts		• Relatively low impact • Dispose of concentration • Requires industrial waste permit • Use existing permitted pond		
Advantages		30		40	*Least Preferred Set of Attributes*		•
TOTAL IMPORTANCES OF ADVANTAGES		170		80		275	

Initial Cost (Net) $ million		2.48		1.65		0.50	
Importance/Initial Cost Ratios		68.5		48.5		550	
Re-design Cost							
Compliance							
Life Cycle Cost (Net) $ million		3.42		2.72		1.94	
Importance/ LCC Ratio		49.7		29.4		142	
TOTAL							
Version 6/4/98							

LIFE CYCLE COST ANALYSIS

Presentworth Dollars

Project/Location: EVERGLADES NATIONAL PARK

Subject: WATER SYSTEM IMPROVEMENTS PROJECT Description: Life Cycle Cost Analysis Project Life Cycle = 25 Years Discount Rate = 7.00% Present Time = 11/98			Alternative 1 NO ACTION (NOT FEASIBLE)		Alternative 2 REPLACE WATER LINE		Alternative 3 SLIP LINE EXISTING WATER LINE		Alternative 4 DRILL NEW WELLS / CONVERT TO R.O.	
INITIAL COSTS	**Quantity Unit**	**Unit Price**	**Est.**	**PW**	**Est.**	**PW**	**Est.**	**PW**	**Est.**	**PW**
A. Construction Cost		$0.00	0	0	2,587,500	2,587,500	1,829,000	1,829,000	1,028,000	1,028,000
B. Contingency (10%)		$0.00	0	0	258,750	258,750	182,900	182,900	102,800	102,800
C.		$0.00	0	0	0	0	0	0		0
D.		$0.00	0	0	0	0	0	0		0
E.		$0.00	0	0		0		0		0
F.		$0.00	0	0		0		0		0
G.			0	0		0		0		0
Total Initial Cost				0		2,846,250		2,011,900		1,130,800
Initial Cost PW Savings (Compared to Alt. 1)						(2,846,250)		(2,011,900)		(1,130,800)
REPLACEMENT COST/ SALVAGE VALUE **Description**	**Year**	**PW Factor**								
A. Pumps (Well & R.O.)	10	0.5083	5,000	2,541	5,000	2,541	5,000	2,541	25,000	12,708
B. Pumps (Well & R.O.)	20	0.2584	5,000	1,292	5,000	1,292	5,000	1,292	25,000	6,460
C. Membranes	7	0.6227	0	0	0	0	0	0	30,000	18,682
D. Membranes	14	0.3878	0	0	0	0	0	0	30,000	11,634
E. Membranes	21	0.2415	0	0	0	0	0	0	30,000	7,245
F. Pipeline Repairs	7	0.6227	70,000	43,592	10,000	6,227	10,000	6,227	2,000	1,245
G. Pipeline Repairs	14	0.3878	70,000	27,147	10,000	3,878	10,000	3,878	2,000	775
H. Pipeline Repairs	21	0.2415	70,000	16,905	10,000	2,415	10,000	2,415	2,000	483
Total Replacement/Salvage Costs				91,477		15,353		15,353		59,232
ANNUAL COSTS **Description**	**Escl. %**	**PWA**								
A. Operations	0.000%	11.654	35,000	407,875	20,000	233,072	20,000	233,072	30,000	349,607
B. Maintenance	0.000%	11.654	40,000	466,143	10,000	116,536	20,000	233,072	30,000	349,607
C. Operators	0.000%	11.654	30,000	349,607	30,000	349,607	30,000	349,607	30,000	349,607
D. Electrical	0.000%	11.654	8,000	93,229	5,000	58,268	5,000	58,268	15,000	174,804
E. Chemicals	0.000%	11.654	15,000	174,804	15,000	174,804	15,000	174,804	15,000	174,804
F.	0.000%	11.654		0		0		0		0
Total Annual Costs (Present Worth)				1,491,659		932,287		1,048,822		1,398,439
Total Life Cycle Costs (Present Worth)				1,583,136		3,794,890		3,077,075		2,588,462
Life Cycle Savings (Compared to Alt. 1)						(2,211,754)		(1,493,940)		(1,005,326)
Discounted Payback (Compared to Alt. 1)		**PP Factor**			34.96 Years		22.01 Years		9.04 Years	
Total Life Cycle Costs (Annualized)		0.0858	135,850 Per Year		325,641 Per Year		264,045 Per Year		222,117 Per Year	

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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